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ABSTRACT

Backpacking serves as the vehicle for teaching basic secondary school subjects in this curriculum guide which suggests various learning activities for teaching human relations, environmental education, and camping. The activities, some for the classroom and some for the trail, are designed to help students observe, draw conclusions, and develop fundamental reasoning skills. The guide begins with a section for teachers about trip planning and organization, group dynamics, outdoor teaching strategies, recreational activities, and environmental values. The following four sections contain units for students under the headings of human relations, natural environment, humanizing camping, and camping skills. Each section contains numerous subtopics each with background information for students, concepts, objectives, and learning activities. The human relations section contains 10 subtopics including value systems, trail dilemmas, and effective leadership. The natural environment section provides 35 subtopics in the areas of astronomy, geology, ecology, fauna, flora, and weather and climate. The section titled "Humanizing Hiking" covers southern California history and culture as well as the verbal and graphic interpretation of outdoor education experiences. The camping skills section covers campsites, equipment, first aid, camp food, personal conditioning, trail safety, survival, and maps. The appendix provides a bibliography of nearly 200 references. (JHZ)

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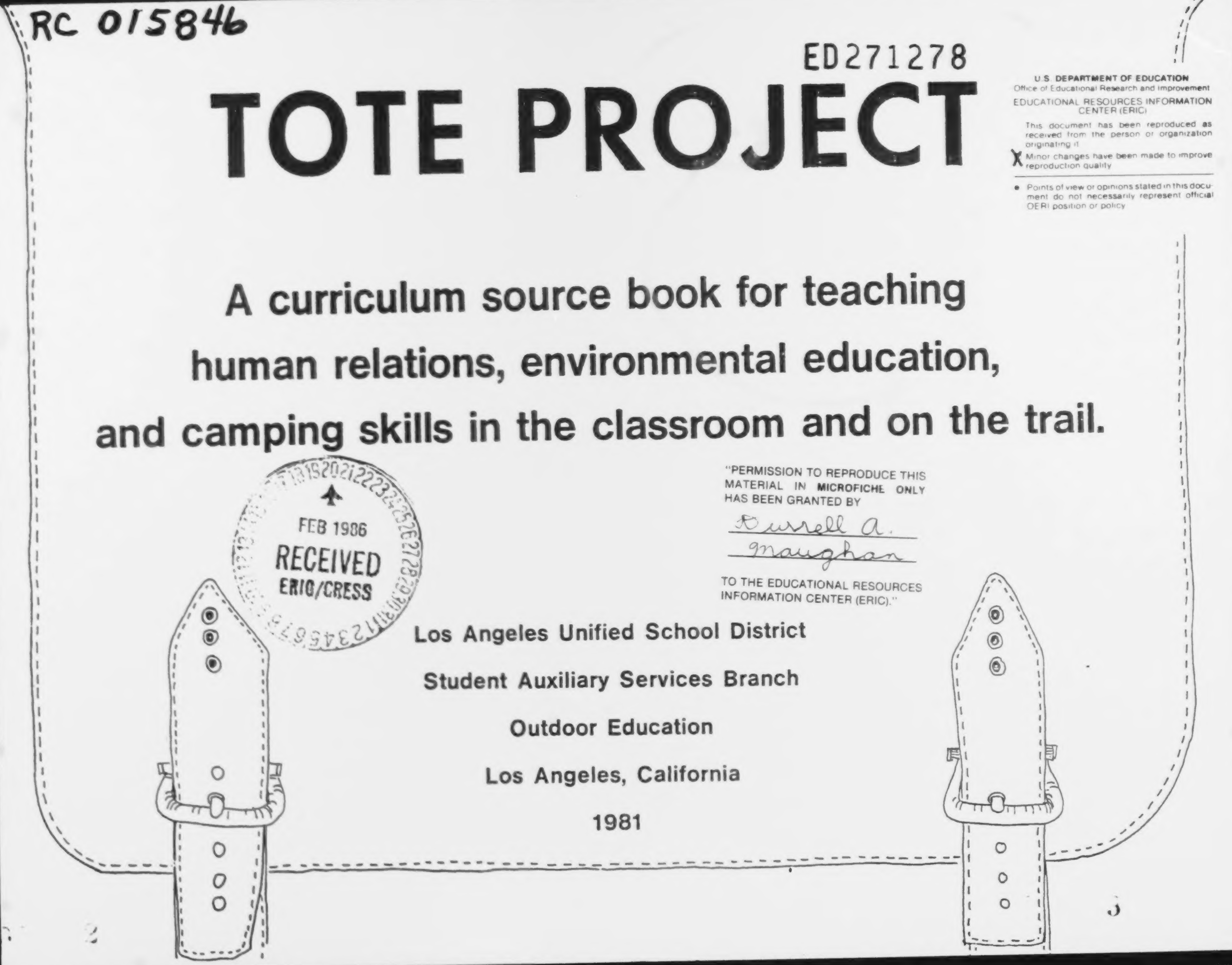

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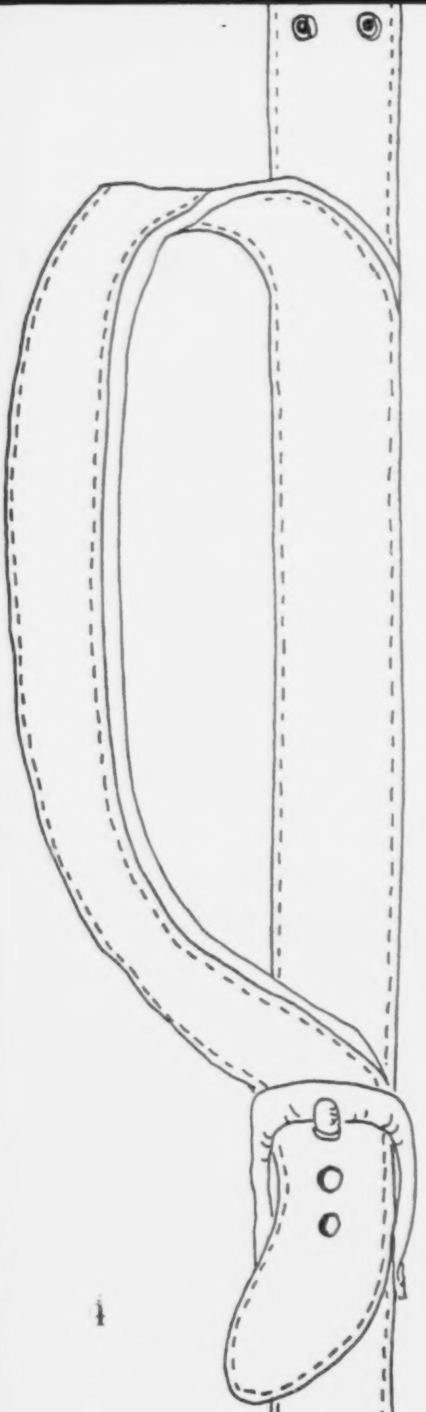

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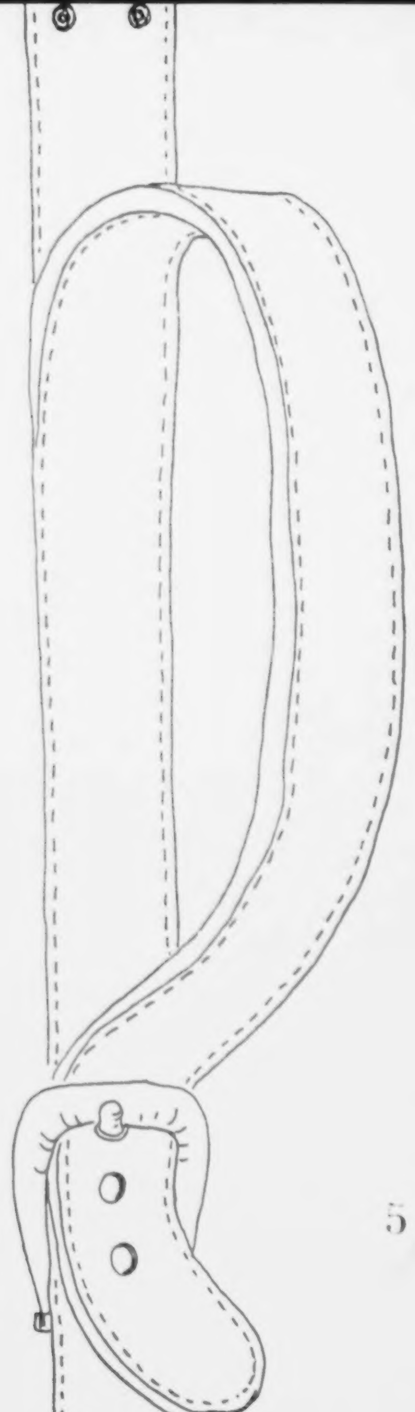

FOREWORD

This source book, which utilizes backpacking as a vehicle for teaching basic subjects in the secondary school, has been prepared by the staff of the Outdoor Education Office, working in cooperation with many classroom teachers and professional experts. The publication will assist teachers in meeting the needs of students as indicated by their interests and experiences in a natural environment.

An effort has been made to bring together under one cover information, concepts, objectives, descriptions of activities, references, and suggestions for guiding students in making observations and drawing conclusions.

The T.O.T.E. Project should provide opportunities for all students to:

1. Observe, discover, and explore interests in a natural environment.
2. Think about, question, and discuss a variety of topics in seeking solutions to social and scientific problems.
3. Make practical use of scientific knowledge and social skills gained.
4. Develop the habit of drawing conclusions based on observations, experimentation, and research in particular areas of study.
5. Read to find new concepts and ideas.
6. Develop appreciation, understanding, and love of the natural environment.

INTRODUCTION

A vital function of education in a democracy is to develop the ability to reason, think, and gain positive social attitudes. The hundreds of facts learned in school are soon forgotten, but habits of thinking and patterns of behavior will endure.

It is essential that our youngsters understand the vital importance of protecting and using wisely our natural resources, that they weigh the evidence before drawing conclusions, and that they use leisure time in a constructive and wholesome way. To each of these desirable attitudes, the T.O.T.E. Project makes a notable contribution.

Although not primarily a reading and writing program, the T.O.T.E. Project offers innumerable opportunities for firsthand experiences in the classroom and on the trail. Students find answers to their questions by observation and experimenting. Habits of gathering evidence and of verifying conclusions are developed. Conditions peculiar to urban centers make it necessary for schools to enable students to enter natural areas by backpacking in order to understand more fully and more intimately their environment.

The main functions of the teaching strategies are to help student develop fundamental skills relating to many topics and to guide students into preforming research and engaging in various activities.

It is suggested that teachers divide the class into committees for the conduct of student research projects. The "curriculum objectives" and "doing activities" provide excellent research topics. They also offer teachers clues for developing projects and activities in the classroom and on-the-trail that will test individual skills and abilities.

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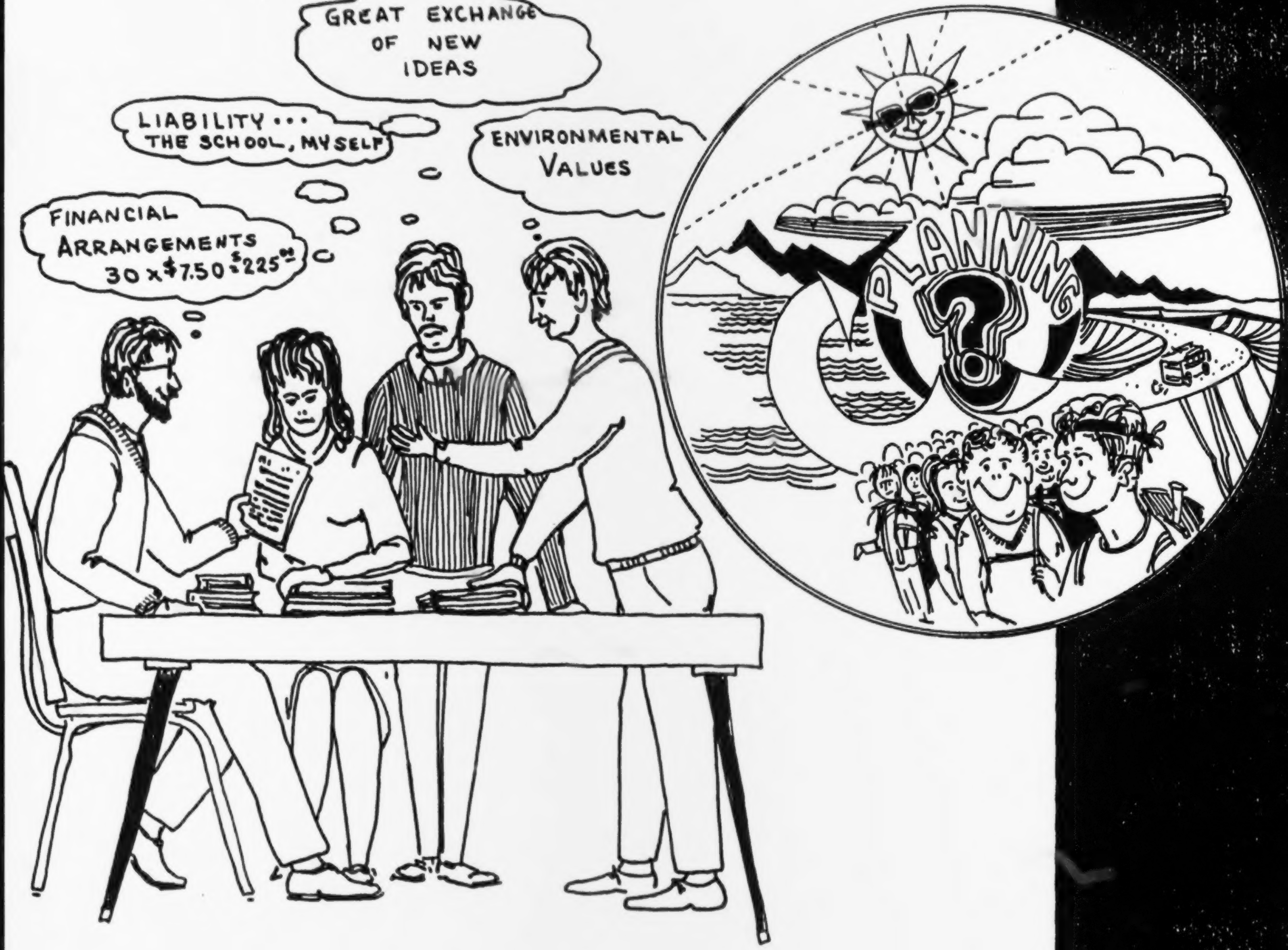
GREAT EXCHANGE OF NEW IDEAS
LIABILITY ... THE SCHOOL, MYSELF
ENVIRONMENTAL VALUES
FINANCIAL ARRANGEMENTS 30 x $7.50 = $225.00
PLANNING
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BASIC CONSIDERATIONS

Before anyone seriously considers backpacking or hiking with a student group, he/she should determine the cost. Such trips need not be expensive, but some cost is always involved. In this section, costs and sources of funds will be enumerated.

Basic cost categories will include:

1. Transportation
2. Equipment
3. Food
4. Personal
5. General group

Each of these categories provides the teacher with some options to consider.

TRANSPORTATION COSTS

Bus

The preferred method of transportation in all school districts is by school bus. Schools are typically allowed a specified number of trips per year by their district office. No cost is charged to the school or teacher for the use of these allocated bus trips. If you wish to take a trip for an outdoor experience, one of the first things you should do is to consult with your principal or his/her designee and find out whether or not you can reserve such buses. If buses are available, file all necessary paperwork to assure your confirmed reservation for the date or dates desired. The early bird catches the worm, right? Why not apply for bus use in the spring of the school year preceding your trip? Show intent and desire by going out of your way to be "first in line."

If there is no bus available from the district, it will be necessary to rent either a bus or rely on private automobile. Usually, the renting of a bus outside school district contracts is relatively expensive, but not always. Check all available bus companies. Do not overlook commercial carriers, such as Trailways and Greyhound. Sometimes they can offer the service you need at a very good price.

Private Automobile

Under some circumstances, private autos may be used to transport you and your group to and from the site of your hike/backpack. Understandably, districts discourage use of private car transportation. (See liability section.) If bus transportation is unavailable and your district will allow use of private auto transportation, be sure costs are understood.

- Who pays for the gas and oil used?
- Do the drivers need term insurance to cover this trip? (a cost)

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TRANSPORTATION COSTS (Cont'd.)

- What happens in case of breakdown or accident? (Split costs?)
- Is the volunteer driver picking up the costs for his/her vehicle?

EQUIPMENT COSTS

Equipment may be borrowed, rented, or purchased. You will need to evaluate your own situation to decide which method suits the needs.

Equipment already available either at the school site or in the district might be appropriate for your use. Time is needed here to save money. Determine what the district has. During class preparation, students should be encouraged to consider whether they will wish to continue with backpacking after the class ends. If they are unsure, it is better for them to borrow or rent equipment rather than purchase it.

Safety demands that certain items of equipment meet high standards. If the proper equipment cannot be borrowed or rented, its purchase may be necessary. Monetary savings are not worth using unsafe, inadequate, or inappropriate equipment.

Clothing is considered equipment in this discussion. Encourage students who might have problems financially in providing such critical items as good shoes, and warm jackets to let you know about the problem. The school lost and found office can be a good source of some clothing items. Provisions of adequate clothing for each student is a financial problem to be resolved.

FOOD COSTS

Sufficient funds to purchase food are a part of the responsibility of the entire group. You can save yourself much concern and possible waste by careful manu planning. Too much food is an unnecessary burden, both physically and financially. Review carefully the Food Selection and Preparation section. It includes much information to help you make choices of a variety of tasty and not overly expensive foods. Choose quality products.

PERSONAL COSTS

Rarely, if ever, can an individual participate in a backpacking trip without incurring some personal expense. There are always items that a student needs or believes he/she needs. It will be your job to discourage students from spending money on items that are not needed. Students tend to oversupply themselves.

GENERAL GROUP COSTS

There are other costs that are the responsibility of group. These include:

- First aid supplies
- Insurance (if not adequately provided by the district)
- Lesson materials
- Admission fees

An important item in planning a trip is the preparation of a complete budget. This budget should assure that there will be safe, efficient transportation; safe, adequate equipment; and sufficient nutritious, tasty food for all participants.

Discuss costs carefully and clearly with the class. Review costs after the trip to determine whether they could have been reduced.

SOURCES OF FUNDING

It would be nice to participate in a program of outdoor education through backpacking that was completely funded through the district budget. However, it is usually necessary to find financing to at least supplement what the district can contribute.

The most common sources of funds are:

1. Student body funds
2. Student fundraising
3. Student fees
4. Special programs
5. Outside groups

STUDENT BODY FUNDS

If your group receives the approval of the Student Council or of appropriate committees, use of student body funds may be authorized. Request permission to explain the trip and its benefit to the school. It is wise to inform the appropriate group at your school at least two months before your trip if you wish financial help. If your group is recognized as a bona fide student organization, it may set up a designated account where monies collected from the group itself can be set aside for use when necessary.

Student body funds may be used to buy any capital outlay items designated for the general use of the student body. Any equipment bought with such funds must be so marked and accounted for each year. You will probably be the person held accountable.

STUDENT FUNDRAISING

Student participation in raising needed funds is important in that it builds enthusiasm and fellowship. Anticipation of the trip is heightened camaraderie when students work together to collect the

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STUDENT FUNDRAISING (Cont'd.)

money necessary. Some ideas? Well, how about the following?

- Combine conditioning and fundraising activities by conducting a "run-a-walk-a-jog-a-hike-athon."
- Plan a pot-luck dinner at which maps and pictures of the area to be visited are displayed. Present an outdoor film.
- Organize a self-service program, selling tickets for later preforming yard-work or house cleaning or for conducting a car wash.
- Conduct a sale of foods, such as "trail mix" for snacking, or of other items, such as a student-prepared family camping guide or examples of nature art.

When raising funds, be sure to meet the district requirements and to obtain approval of school well in advance.

STUDENT FEES

If the trip is a recognized part of the school educational program, you may not charge a fee. (California Education Code, Section 3204)

If, however, your school district approves the trip as a voluntary, extracurricular, or recreational activity outside the educational program, you may charge a fee.

It would be unfortunate if any student is prevented from participating in the trip for financial reasons. When working out financial arrangements, keep the costs at a minimum. Try to provide some funds to aid needy students.

SPECIAL PROGRAMS

School districts have many special programs which may supply funds for student activities. Each program has specific criteria to be considered before an allocation can be approved. Check with the appropriate administrator as to whether your request will qualify. By emphasizing certain aspects of the proposed trip, you can often justify a request for financial assistance. Some examples of special programs are:

- ESEA Title I (Compensatory Education)
- ESAA (Integration)
- Reading Programs
- Gifted Programs
- S.I.P. (AB65 - School Improvement Programs)
- Career/Voc. Ed/ROP
- Bilingual Education
- Special Education

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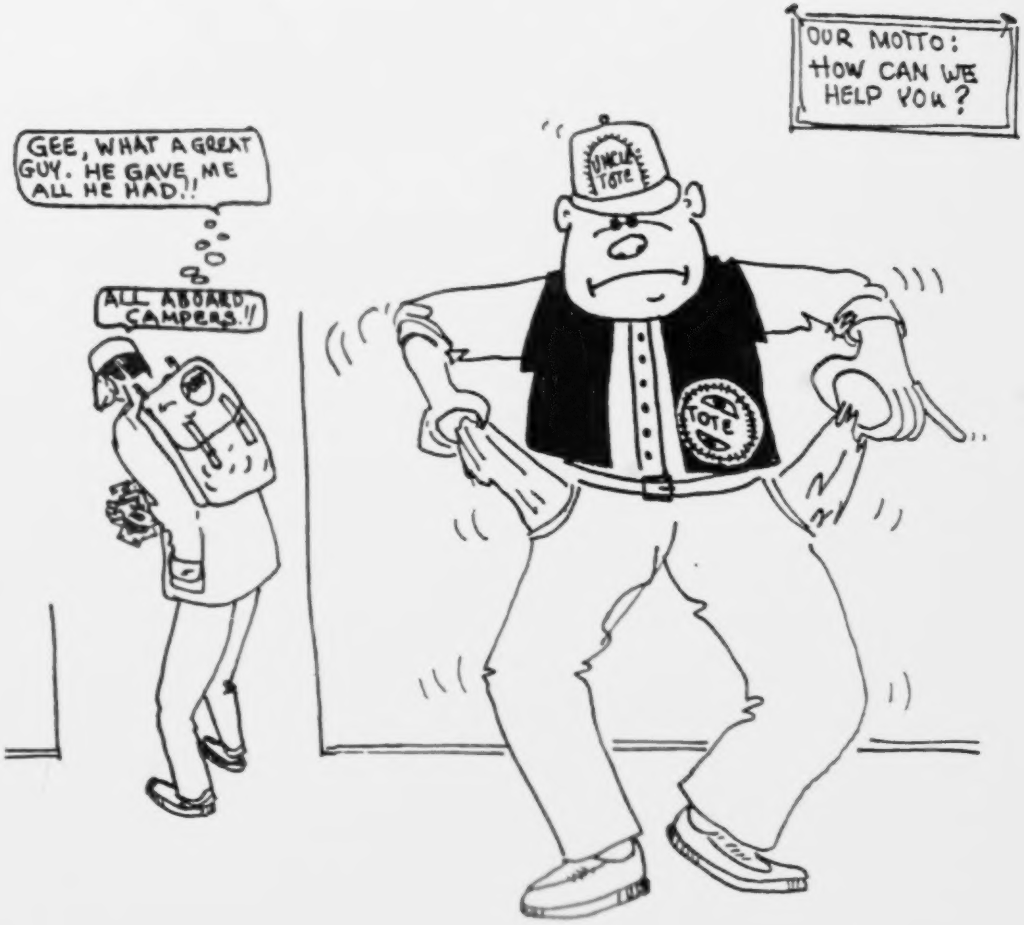
OUTSIDE GROUPS

Many outside agencies, clubs, businesses, and other groups assist with school programs. For help in paying for transportation, equipment, or food, submit a request to an outside group, clearly describing the benefits of the proposed outdoor experience.

All gifts must be received according to the procedures and rules established by the school district. This policy is to your advantage. It assures proper acknowledgment and accounting of all items. Consult with your school administrator before soliciting or receiving any gifts.

Some items may be borrowed from students or their friends. Many have extra backpacks, cooking sets, etc., that they will loan. It is important that class members understand the quality, type, size, and other characteristics of the equipment which is to be provided from home.


OUR MOTTO: HOW CAN WE HELP YOU?
GEE, WHAT A GREAT GUY. HE GAVE ME ALL HE HAD!!
ALL ABOARD CAMPERS!!
UNCLE TOTE
TOTE

I THINK I BETTER CHANGE THAT MOTTO!!

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LIABILITY

GENERAL COMMENTS

The inherent nature of hiking/backpacking trips demands attention to questions of liability. In this section, the procedures to minimize liability will be outlined.

The key to determination of liability is negligence. If a person is found to be negligent, then that person can be held liable for injury, accident, illness, or death resulting from such negligence. Negligence is defined as the failure to exercise reasonable care in a given situation. In the majority of situations, common sense will dictate what is and what is not reasonable care. These are among the critical areas to be considered:

1. Approval
2. Transportation
3. Supervision
4. Emergency preparedness
5. Insurance
6. Equipment

APPROVAL

District

The first step in receiving the approval necessary for an out-of-doors trip is to confer with your principal or his designee. Usually, forms giving the details of the proposed trip and justifying its value to your students must be processed through this administrator.

Districts usually have clearly defined procedures which must be followed to obtain approval from the Board of Education. Some routine field trips have ongoing approval. In almost every instance, however, a proposed hiking or backpacking trip will require specific approval. Be sure to:

1. Apply for approval at least two months before the date of which the trip will begin.

2. Verify with the school administrator that all required procedures have been observed.

Board approval does not release you from all liability, but it does assure you of a co-defendant in case of legal action.

Parent

Parent approval is critical before taking students on any trip. Usually, the district provides "trip slips" to be signed by a parent. It includes a description or basic details of the trip and a request that parents sign the form, acknowledging the students' participation and authorizing emergency medical help. Be sure that the "trip slip" contains a request for information concerning special medical requirements (allergies, medications, etc.).

GENERAL COMMENTS

Parent (Cont'd.)

It is desirable to provide parents with as much information as possible. Inviting parents to a meeting where any concerns or questions can be cleared up is profitable. If it is not possible to arrange such a meeting, it would be advisable to send parents an informative letter.

Describe the course content and the curricular and personal goals for the trip. Explain how trip insurance can be obtained. Parent cooperation results from a clear sense of purpose and organization.

TRANSPORTATION

District school buses are the safest form of transportation. Their use removes a great area of possible liability from your shoulders.

If private transportation is to be used, you must obtain approval from your principal and the district. When private vehicles are used, follow these guidelines:

1. Advise drivers of such vehicles of any liabilities they assume.
2. Verify that each driver is 18 years of age or older and has a valid driver's license.
3. If a driver is under 18 years of age, you must have the written approval of his/her parents to operate the vehicle and to assume the appropriate liability.
4. If there are to be drivers under 18 years of age, the parents of all students to be transported by them should be notified.
5. The owners of all private vehicles to be used must meet insurance liability requirements. Currently the Los Angeles County Schools Office recommends that a minimum $100,000 - $300,000 policy be carried by each car owner.
6. The vehicles to be used must all be properly licensed and registered in the State of California.
7. The number of persons transported in a private vehicle must not exceed the number the vehicle was originally intended to transport safely.
8. In no event, regardless of the design capacity of the vehicle, can more than eight persons, including

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TRANSPORTATION (Cont'd.)

the driver, be transported in a private vehicle. Only a legally defined school bus can transport more than eight persons.

9. No pupils may be transported in a trailer or in the cargo space of a truck or van.

SUPERVISION

The absolute minimum supervision for any field trip is one adult for each ten students. Because of the special nature of hiking/backpacking trips, it is suggested that there be a minimum of three adults for each trip. Coed groups must have both male and female adult supervisors.

Every group of students participating in district-approved outdoor trips should be accompanied by at least one certificated employee of the district.

If parents or other volunteers accompany the group, note the following:

1. Volunteers should not bring children who are less than the age of the group. Their presence increases the risks and lessing effectiveness as volunteers.

2. You are morally obligated to explain to all volunteers their risks and liability. Discuss the concept of reasonable care and the possible hazards of the trip.

3. A non-certificated volunteer is not covered by the Workmen's Compensation benefits of your district. Unless the district is proved to be negligent, a volunteer has no recourse against the district in the event of accident or injury.

QUALIFICATIONS OF SUPERVISORS

To meet the criteria of exercising reasonable care and avoiding any charges of negligence, it is recommended that all supervisors fulfill the following minimum standards:

1. Be in good physical condition.
2. Be able to read a topographic map.
3. Be able to use a navigating compass.
4. Have some backpacking experience. Among the members of the supervisory group (including yourself), there should be at least one person with the following additional qualifications:
    a. Holds a valid American Red Cross First Aid Card.

QUALIFICATIONS OF SUPERVISORS (Cont'd.)

b. Has received specific training in the treatment of snake bite.

c. Holds a valid American Red Cross or Heart Association Cardiopulmonary Resuscitation Card.

d. If hiking will involve being near a lake or river — Holds a Water Safety or Life Saving Card.

You would be wise to obtain from the offices of the American Red Cross and the American Heart Association early in the school year the schedule of training sessions for first aid, CPR, life saving, and other subjects. Then, as you meet with parent volunteers, you can advise them regarding any necessary training.

EMERGENCY PREPAREDNESS

The following procedures should be followed in preparation for a trip. Since they constitute what would be considered exercising reasonable care if a question of negligence should arise:

1. Prepare a student roster which includes emergency telephone numbers.
2. Compile a list of emergency telephone numbers (hospitals, U.S. Forest Service Stations, Sheriff's Departments, etc.). Discuss this list with all adults accompanying you on the trip.
3. Notify the U.S. Forest Service or other agency concerned about your trip.
    a. Describe the route and duration of the trip.
    b. Obtain any necessary trail or fire permits.
    c. Determine whether any specific problems may be encountered in the area of the trip (e.g., snow, flood/damage, fire, etc.).
4. Assemble a complete first aid kit to be carried by the group throughout the trip. See First Aid section for minimal contents.
5. Establish emergency and "chain-of-command" procedures for everyone participating in the trip.
6. Assign an adult to keep a daily log of activities.
7. Set up a parent "telephone tree" for use in the event of an emergency.

INSURANCE

Most districts make term medical and/or trip insurance available to students. Ask your administrator or appropriate district office what must be done to provide this insurance. Term policies are usually very inexpensive. Pass this information on to parents.

Be sure to check on the insurance coverage for any private vehicles to be used. A minimum of $100,000 - $300,000 liability insurance is recommended.

Teacher personal liability insurance is available from some companies. It is a good idea to give yourself this added protection.

GOOD PLANNING
POLICY
WE ARE TOTALLY COVERED GANG

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OF GROUPS AND INDIVIDUALS

Nothing you plan for a student experience in the mountains should be considered that does not take into account group interaction. A group is made up of individuals, and these individuals bring together varying abilities, capacities, knowledge, and needs. A group is not simply the sum of its parts. Being a part of a group changes that way in which persons relate. Groups take on a character, a personality. It is up to you as the teacher to prepare the members of your group to work well together and to reach the goals set for the hiking or backpacking experience. Success depends on preparation.

Well in advance of the trip, evaluate the members of your class in regard to their working with others and accepting the stresses that will be involved. A knowledge of the group will help in planning and in preparing you to deal with crises that may occur. Many commercially prepared tests and inventories can assist in assessing attitudes of students toward themselves, toward others, and toward school. Some suggested instruments for such an evaluation are:

Allport, Vernon, Lindsey Study of Values
Edwards Personal Preference Schedule
Bell's Adjustment Inventory
Humm - Wadsworth Temperament Scale
Forer Structured Sentence Completion Test
T.O.T.E. Introspective Pupil Inventory
(produced by the Los Angeles Unified School District)

Although teachers constantly assess students with regard to personality and interest, a formal instrument can be useful in pinpointing traits of individuals and in developing a picture of the group personality. Most teachers are not qualified to interpret thoroughly the results of these inventories. All, however, can identify characteristics, such as self-assurance, enthusiasm, loneliness, etc., and use this information wisely. It is important to remember that some young people act differently when out of the classroom. You need to use whatever means you have to obtain a clear picture of group character.

LEADERS AND FOLLOWERS

Every group needs direction, and that direction depends on adequate leadership. You are the obvious leader and have the final responsibility. You are the one who has decided to arrange this hike and should understand more than anyone else the desired goals. It is wise to communicate clearly and tactfully your authority to other adults accompanying you on the trip. Because you have the ultimate responsibility, you must maintain control. The hike will be a success if you can assure that:

LEADERS AND FOLLOWERS (Cont'd.)

1. The goals of the trip are clearly communicated.
2. The limitations on individual freedom are outlined to everyone before the trip.
3. The physical demands are within the ability of the group.

THIS IS LEADERSHIP

A leader is an initiator. Be prepared. Be ready to step in where necessary and make decisions. A leader also knows when to step back. Build leadership in the group. Don't assume all responsibilities personally. Everyone, including you, has strengths and weaknesses. Assign tasks in line with abilities and interests whenever possible. Spread responsibility. Use experienced students as leaders if they possess adequate leadership skills. A printed list of student names and their specific responsibilities will help stabilize the class unit.

BUILDING UNITY

A key to successful group dynamics is evident in the feelings of the group and its mental health. How do they see themselves, each other, the teacher, and other leaders? An attempt should be made to build group unity.

Discussion before the trip will heighten interest and anticipation. Many games and activities are available, either from commercial sources or through school district offices (Intergroup, ESSA, Title I, etc.). These resources are designed to break barriers and produce better group feeling. Role-playing activities and writing exercises to elicit feelings concerning the mountains, wild animals, forest fires, and previous experiences can be shared and will help individual class members prepare to share the rigors of the trail. Talk to your class about the impact that 25 students might have on the wilderness and how this might be minimized. Help them to feel a part of that experience.

On the hike itself, the group will function better if the pace is controlled so that every incident does not seem to be an ordeal. Frequent stops to rest, study, eat snacks, and share ideas will improve the interaction of members of the group and cause memories to be positive. Find ways to distract the group from discomforts and to emphasize the positive experiences.

Activities planned following the trip can engender positive recollections. These may include a debriefing session clearly publicized for the information of the entire school, a party to share pictures taken on the weekend, a school assembly,

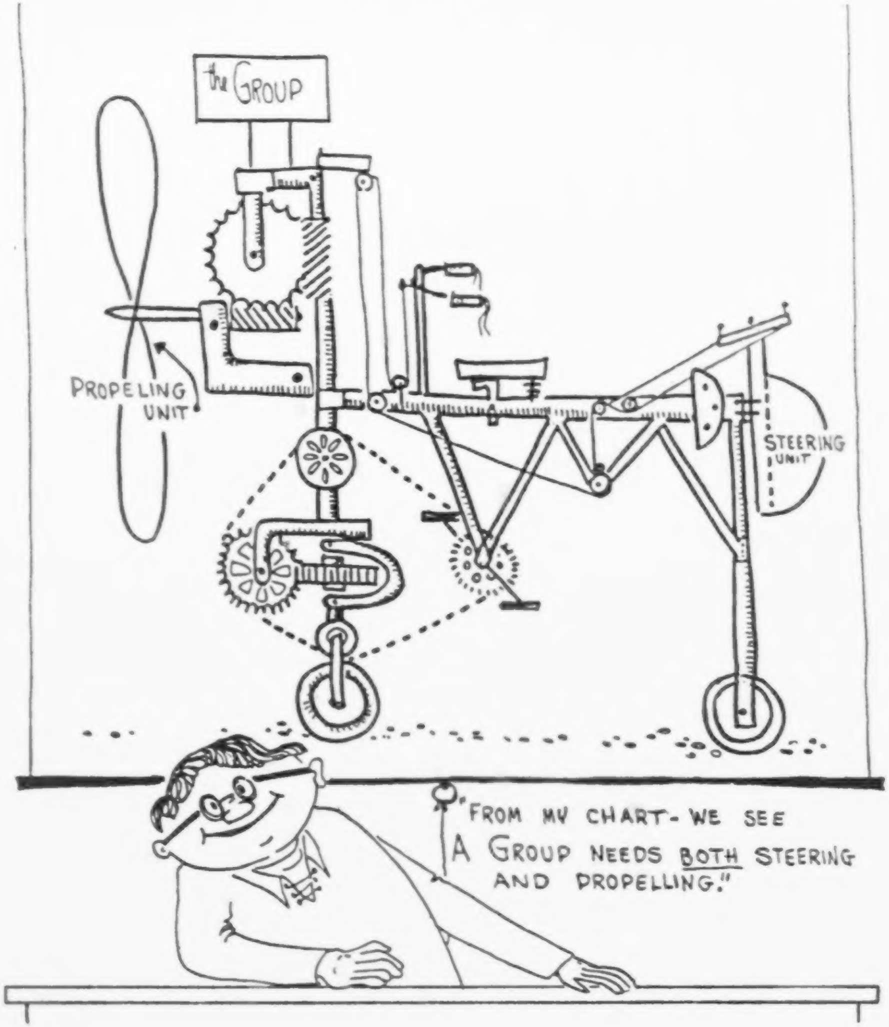
BUILDING UNITY (Cont'd.)

and a special newsletter. Anything to build further the learning and sense of accomplishment will cement relationships, reinforce achievement of educational goals, and minimize the impact of any unpleasant episodes.

It has been said that a group needs both steering and propelling. Steer the natural interests and desires of students into plans for the trip. Be prepared to propel and to force direction when necessary to assure a safe and profitable learning experience. Enthusiasm is the key. You are a special teacher to the students because of their special opportunity. Make the most of it. Your enthusiasm for the mountains and camping should be catching.

In summary, the following elements are important:

1. Your leadership is consistent, dependable.
2. Responsibility is broadly based.
3. The group identifies with common goals.
4. Open communication exists throughout the group.
5. The individual is respected.
6. Response to crisis is orderly and rational.


the GROUP
PROPELING UNIT
STEERING UNIT
"FROM MY CHART- WE SEE A GROUP NEEDS BOTH STEERING AND PROPELLING."

Instruction in outdoor education should be a pleasurable experience for the teacher as well as the student. The big emphasis should be on the way you approach the subject matter. If you have enthusiasm... it will show. It's contagious.

It is important to know your subject matter. You, the instructor, should do your homework. Before conducting any activity, try it out and see if it works. It is wise to take a test run to the area to see whether there are any trouble spots.

In presenting material, keep it simple and proceed slowly. The lesson should be presented as though the students were in primary grades; but the tone should not be condescending. Patience is a must, especially when teaching very specific concepts in a laboratory situation.

Do not be afraid to present units that are foreign to you. Just take them slowly. Cover only as much detailed information as you feel is desirable. Be sure you understand the subject matter. If you have students in the class who are knowledgeable, ask them to assist you. Students can be an excellent resource. No teacher can be an expert in all fields of study.

Encourage students to conduct further investigation on their own.

One major purpose of outdoor education is to bring the outdoors to youngsters who are city oriented and to help them perceive with all their senses. Do not feed them just facts but ask them questions to get them really to "see." The students should touch, smell, and even taste. When their bodies and muscles are involved, more parts of the brain are stimulated, greater learning can occur, and more will be retained.

At a time when the world is speeding by, people tend to forget about other persons. Thus, the importance of the group and team work should be stressed. The members of the group will have to compromise, share activities, share chores; and, in short, work as a unit. They will discover how important each member is to the group. When one person lets down, the whole group feels the pressure. Menu planning, wood collection, turns at cooking -- just to name a few examples -- all require the effort of the group. You have the responsibility of knowing your students and their capabilities. Their experience can only be meaningful if the group has planned well and is well organized.

To avoid any mishaps, you should prepare very carefully for the outing. Your students should understand the ground rules, and their should be no deviation from them.

Backpacking and camping experiences for students should be filled with a variety of recreational activities. The T.O.T.E. curriculum material suggests many "doing activities" for the classroom, the trail, and the camp. But the teacher should make an effort to include other recreational activities as a part of the trip.

With a little imagination, you can turn even the most mundane aspects of backpacking into some form of recreation. For many students, T.O.T.E. will be their first contact with backpacking. To some, the idea of camping out may seem alien and unappealing; and the prospect of carrying 30 pounds on their backs may repel others. You can alleviate most of this initial concern by introducing backpacking as a game. For example, ask students to carry their packs with them at school. This will help the students become familiar with the basic equipment of backpacking, as well as trigger the interest of others in the T.O.T.E. project. A cookout held after school can be used to introduce students to the type of dehydrated foods and the stoves they will be using on their trip. Problems of hiking and of finding one's way in the wilderness can be addressed in orientation sessions held during class or after school. You may also wish to arrange a brief introductory field course for students.

Divide the students into groups and stage a race to determine which team can complete the course first. Present a "prize" to the winners.

By participating in these types of activities prior to the trip, students will be more at ease with their equipment and will better understand what is expected of them on the trail and in camp.

The teacher should make every effort to assure that the backpacking experience is enjoyable for all students. While covering the curriculum material, do not overlook the fact that time also is needed for "pure and simple fun."

Group singing is almost a spontaneous event in the outdoors. Singing on the trail can help lift tired spirits and help weary hikers forget their packs and the steepness of the climb. To help encourage sing-alongs, find a book of camp songs and distribute copies to everyone in class before the hike begins. You may wish to ask students to practice the songs before leaving or to try them out on the bus ride to the trail head.

Campfires are natural places for teaching new songs. You may introduce a new song by reciting each phrase, or you may ask each student to teach the whole group a song he/she enjoys. Other activities for campfire include discussing the area' natural history, reciting stories and poems, and staging minidramas and skits. An entire evening's campfire program can be easily developed in advance by assigning portions of the program to groups of students.

Recreational activities should involve all the members of the group and can be used to reinforce basic curriculum objectives as well as to strenthen self-confidence and stimulate group dynamics.

The San Gabriel Mountains are a unique wilderness area, partially because of their plant and animal life and partially because they form a natural barrier to the growing population of Los Angeles. For all of the residents of Southern California, the San Gabriels offer an opportunity to hike and camp in forested lands.

As you teach students backpacking skills and review the various areas of the T.O.T.E. curriculum, emphasize the uniqueness of this area and of all wilderness areas. Cities have grown to such an extent across the United States that it is only in the limited natural areas that evidence can be found of what this vast country was once like. Students should be encouraged to examine their values regarding conservation and economic needs.

Obviously, the size of the population and its needs require the use of many natural resources. Human needs cannot rightfully be ignored in order to conserve the natural environment, but it is worthwhile to examine specifically what are considered needs and to determine which are absolutely necessary.

Environmental values should be considered in discussions at various points throughout the course of the trip. An emphasis on such values is necessary both because of a need to heighten people's awareness of the importance of conservation and because of the pleasures that the wilderness offers.

In the classroom, before students leave on the trip, ask them to evaluate their attitudes toward the forest and its natural resources. What items in their daily lives would they be willing to do without to protect the resources? What methods of conservation can they devise that would help reduce our demand for natural resources?

During the bus ride en route to the San Gabriels, ask students to keep a log on the changes which they observe. What different sounds do they hear? What smells do they notice? What is the color of the sky? On arrival in the mountains, the students can share their notes. Ask them to imagine what the mountains would be like without highways, buses, and cars. What changes do people bring to the wilderness?

A world devoid of quiet, natural places to visit would be empty and hollow. Allow students time simply to wander in the woods or to sit under a tree. Ask them to choose a particular tree or animal and to think of the many ways in which the plant or animal interacts with its world; then ask students to think about or discuss their own interactions with the natural world. Since coming to the mountains, have their values about the wilderness changed? In what ways?

CONCEPTS

1. Human kind's relationship with nature must be that of human kind and nature: a relationship based on ecological

CONCEPTS (Cont'd.)

understanding and cooperation.

2. People use the natural resources in the environment to satisfy their needs.

3. The people's use of the environment (controlled or not) severely affects the supply of natural resources.

4. Conservation is one means of minimizing the adverse effects of people on the environment.

BACKGROUND INFORMATION

As you study the natural and physical history of the San Gabriels, pause for a moment to consider your own place in this environment. What benefits do you derive from the mountain's wilderness? Are the benefits all economic or are some important to you in a more personal way?

Learning to appreciate the natural environment is as important as learning its many physical attributes and economic benefits. Appreciation comes on two levels; you enjoy the many economic resources that the forest offers. It is as important to conserve an area for its wild, untamed attributes as it is to designate other areas for purely economic value.

Consider the green plants around you for a moment. In many ways, these grasses, herbs, shrubs, and trees are the cornerstone of all other life on earth. Not only are they able to produce their own food through the photosynthetic process, but at the same time they are able to provide a food source for almost every other living organism. Trees and plants are also important in purifying the air and in providing the environment with shade and watershed.

Think about the animals that live in the mountains. What is their role? How do they interact with their environment? What is the relationship between human kind and wild animals?

People are very dependent on the natural world. This simple fact is often forgotten in industrialized, urban surroundings. Everything that people do to the earth affects the natural environment in some way. Not all of these changes are bad, but many have caused severe damage to the natural world that people depend upon.

Being aware of the interdependence of people with the natural world is a first step toward lessening destruction of it. The air people breathe, the water they drink, the forests they admire and find peace in--these are all necessary to physical and spiritual well-being, and people should treat their things with care and respect.

CURRICULUM OBJECTIVES

Students will be able to:

1. Choose one resource and list the uses in an urban environment.

2. List five things in the environment that are important to the students and give the reasons for their importance.

3. Construct a list of resources that students value and establish a priority for each. Give an example of how they might conserve or nourish each resource.

"DOING ACTIVITIES"

1. Discuss the various factors in the students' culture that determine their own attitudes toward the environment.

2. On a hike, point out the basic resources that are essential to humankind's survival.

3. Identify one natural thing in the forest which the students value and share it with the group. Why is this thing important to them?

4. Keep a section of their logbooks for noting changes that people have in the wilderness. At the end of the trip, prepare a composite list from the individual lists. What changes are good? Which ones are bad? Why?

HUMANIZING HIKING

CONCEPTS

1. The importance of the environment to humanity requires that people develop an awareness of the direct effect of the environment on them.

2. Contact with nature--through seeing, touching, smelling, listening, tasting--will help students to develop an immediate appreciation of the outdoors.

BACKGROUND INFORMATION

From the early days of the discovery of America until the present, its landscape has been praised for its beauty and scenic grandeur. Conserving this wilderness heritage has become increasingly important as the nation's population grows in size.

One of the great initiators of wilderness conservation, John Muir, visited the San Gabriel Mountains in the late 1800's. His writings did much to help preserve this area as a national forest. The writings of John Muir are available in any library. Look for a collection of his work and share his views of the mountains with your class. What did he particularly value about this

BACKGROUND INFORMATION (Cont'd.)

range? Students may re-evaluate the mountains in light of his writings. What changes have come to the San Gabriels since John Muir visited them.

Using John Muir again as a stepping stone, ask students to investigate conservation efforts in California today. What are some of the current issues? How do they effect the population? What are the economic and environmental trade-offs?

In addition to discussing environmental values from a historical perspective, view the natural world from a more immediate point of view. Ask students: What impact does being in the wilderness have on you? Why?

So often in the city, filled as it is with industrial noises, people forget what true peace and quiet are like. They forget the natural sounds, the pleasant hues of blue skies and green trees, and the feel of the soft earth. Hiking and camping in the forest give people a chance to re-establish a relationship with the natural world. Such moments are precious. There should always be a time for simply sitting beneath a tree, appreciating it and its environment.

CURRICULUM OBJECTIVES

Students will be able to:

1. Choose one resource and give an example of how it affects their five senses.
2. Make a list of social, physical, political, and economic factors that affect environmental decisions.
3. Define a plan for preserving/conserving a resource which they value.

"DOING ACTIVITIES"

1. Take a short hike with a partner. One student should be blindfolded. The other student should describe all that he/she sees in nature; then the students should exchange roles. Afterward, they should discuss what they saw when they had to visualize as much as possible from the eyes of someone else.
2. Wear a blindfold for an hour. How is the sense of touch affected by the ability to see?
3. Study a particular environmental problem through newspaper articles. How do these articles reflect or attempt to change society's attitude toward the environment.
4. Set aside a half-hour for meditation on the surrounding wilderness. Students may sit alone under a favorite

"DOING ACTIVITIES" (Cont'd.)

tree or rock. Afterwards, have them write their thoughts in their logs and share them with the group.

CAMPING SKILLS

CONCEPTS

1. The earth contains a limited supply of all natural resources.
2. People must understand their dependence on these limited resources and accept the responsibility of protecting, conserving, and replenishing them.
3. Conservation is important while camping in the wilderness; it is equally important in one's daily life in the city.

BACKGROUND INFORMATION

Wilderness areas are becoming increasingly popular as more people learn the pleasure of backpacking. This means that the areas in which you are hiking are subject to extremely heavy use each year. It is therefore important that you act in a way that will preserve and conserve the wilderness heritage for everyone.

When you are hiking and camping in the wilderness, think of the joys you derive from being there and the ways in which these areas can be conserved for others. Basically this means doing four things:

1. Be careful with fire. Do not let a carelessly dropped match ruin the mountains for years to come. Check your fires to be sure they are dead out. Check posted fire regulations before setting out on the trail.
2. Be careful on the trail. You can help prevent erosion of trail areas by simple, thoughtful acts: do not cut trails or take short-cuts when hiking; do not disturb plant life along the trails. Stay on the marked path and off the fragile vegetation.
3. Be careful with water resources. Water is scarce in the San Gabriels during the summer and fall months and should be conserved. Human water pollution is a serious problem in all camping areas. Many streams and lakes have been polluted by careless campers.

CURRICULUM OBJECTIVES

Students will be able to:

1. Cite three reasons for the need to conserve/preserve the natural environment.
2. Demonstrate good conservation techniques when camping.

"DOING ACTIVITIES"

1. Learn and practice conservation techniques while backpacking.
   a. Do not litter on the trail nor while in camp.
   b. Remove any litter left by previous hikers.
   c. Stay on the trail.
   d. Be careful with fire.
   e. Do not pollute or waste water resources.
   f. Practice proper disposal of organic waste.
2. Hike to locate signs of people in the outdoors.
   a. How have people modified the environment?
   b. Why have people caused these changes?
   c. What effect have these changes had on the environment?
3. Cite a value (something of importance to you) regarding the environment. Orally or in written form, then determine:
   a. How the value affects my behavior.
   b. How the value effects my balance.

TOTE IS GREAT SPORT
TOTE IS FOR ALL
REST
"Pack your own Pack
LOST LITTER
RAIN OUT LOSE 1 TURN
OUT
BACK 3 SPACE
ICE
FIRST AID STATION

BEST COPY AVAILABLE

CONCEPTS

1. Students need to discover the different forms of communication by which people learn.
2. Students need to explore the use of verbal and nonverbal communication as tools for developing a learning climate and establishing a positive self-image.
3. Much of the reliability of communication depends upon the ability to interpret the meanings intended as people interact verbally and nonverbally with others.
4. Students need to explore verbal and nonverbal communication in situations of deliberate concealment, recognizing ways of revealing and concealing feelings and emotions.
5. Practicing communication skills may increase poise, grace, and freedom of expression; develop a keener power of observation; and create a greater awareness of the feelings of others.

BACKGROUND INFORMATION

Communication is a social process that involves interactions between two or more individuals. Student success in school is related to the social climate and to the effectiveness of communication in class.

Students should understand that learning depends on different forms of communication. All the senses are involved in the learning process. Everything that people learn is communicated through their bodies. Everything that is taught is communicated through their bodies. People look at each other to see if they recognize one another, to observe emotions or reactions, to communicate, and to see what they are like.

People communicate in different ways at different times. They communicate with their family, friends, co-workers, other students, group members, those with similar interests, and others. The form and level of this communication help to develop and establish the type of persons they have become.

Body contact is a primitive form of social contact that is practiced by humans and animals. The symbolic contacts, like shaking hands, patting the back, etc., are gestures that may have quite different meanings in other cultures.

People use facial expressions, body postures, walking gestures, and voice tone to convey joy, pleased surprise, distaste, anger, simple greeting, uncertain recognition, worry, annoyance, fear disbelief, pleading, and firm conviction. These are called paraverbal or nonverbal forms of

BEST COPY AVAILABLE

BACKGROUND INFORMATION (Cont'd.)

communication.

Opportunities in the classroom and on the trail should be designed to encourage students to communicate their feelings or emotions. The T.O.T.E. project provides many lessons that will help students express their feelings about issues and situations which will occur as part of their experiences in this course.

The only reason for humans to learn to read, write, and compute is to communicate with one another.

CURRICULUM OBJECTIVES

Students will be able to:

1. Practice written, oral, and nonverbal forms of communication to express their feelings and emotions.
2. List ways that people of other cultures use nonverbal gestures that may have quite different meanings. Than those with which students are familiar.
3. Define how people use their senses to increase their ability to communicate and increase the capacity to learn.

"DOING ACTIVITIES"

See the lessons that follow.

PARAVERBAL AND NONVERBAL COMMUNICATION CLINIC
LOVE THOSE TOTE PROJECTS AND LESSONS, WHY MUST THEY STOP?

COMMUNICATION ON THE TRAIL

Name ______________________ Date ______________________

Directions: It is common for a person to assist or support another person when backpacking. Most people want to be friendly. Then, too, if a person finds himself/herself in a situation where assistance is needed, that person will welcome it. However, there may be times when just the opposite is true. An individual may not want to help another, or another person may not want to receive help. This activity will demonstrate how persons are likely to feel about certain situations.

Do some brainstorming and make a group list of all of the situations you can think of in which you might need someone to help you on the trail. You will have 10 minutes to prepare the list.

Note to Teacher: After 10 minutes have elapsed, ask the groups to report to the class on the results. After each statement, call for a show of hands by those individuals who would want to receive help if they were in that particular situation. A brief discussion may be held regarding each statement.

SITUATIONS:

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________
6. ______________________
7. ______________________
8. ______________________
9. ______________________
10. ______________________
11. ______________________
12. ______________________
13. ______________________
14. ______________________
15. ______________________

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NONVERBAL COMMUNICATION

Name ______________________________ Date ______________________________

Explain and demonstrate what is meant by nonverbal communication. Nonverbal expressions may be used to reinforce the words that are spoken. Sometimes people say one thing, but their expressions say something else. Which is the true feeling, words or action. Conflicting messages cause problems because people do not know, for sure, how to respond.

The teacher should ask the following questions:

1. Without my telling you, how many of you know when I am happy? Ask for a show of hands.
2. Will someone demonstrate what I do and how I act when I am happy? Select one or two individuals to demonstrate.
3. Even if I do not say so, how many of you know when I am angry? Ask for a show of hands.
4. Will someone demonstrate what I do and how I act when I am angry? Select one or two volunteers to demonstrate.
5. Ask class members to demonstrate nonverbally the following situations:
    a. Friendliness to a new student.
    b. Unfriendliness to another person.
    c. Cooperation with a substitute teacher.
    d. Interest in another person in this group.
    e. Boredom with this class.
    f. Regreting that a good friend of yours is moving to another city.
    g. Being disrespectful to a visitor to the class.
    h. Appearing to be innocent when you are accused of doing something wrong.

OPEN COMMUNICATION

HOW ARE WE ALIKE?

Name ______________________ Date ______________________

Directions:

1. Based upon your own observations, pair students with other students with whom they have had little contact or interaction but with whom they might like to be friends.

2. The idea is to demonstrate that it is necessary to know something about another person before you can be a friend, and that the more you know about another person, the more likely it is that you will become a friend.

3. You have 10 minutes to make a list of the things that the students you wish paired have in common or the ways in which they are similar. Think of a variety of similarities rather than listing things in the same general category (e.g., discourage such listings as "We both like football, baseball, soccer).

4. After 10 minutes, each partner should place a star next to the item that surprised him/her the most and an X by any other items that were surprising.

5. As time allows, ask pairs to share the marked items with the entire class.

SITUATIONS: 1. ______________________

2. ______________________

3. ______________________

4. ______________________

5. ______________________

6. ______________________

7. ______________________

8. ______________________

9. ______________________

10. ______________________

11. ______________________

12. ______________________

13. ______________________

14. ______________________

CONCEPTS

1. The primary causes of conflicts are the differences in needs, values, and wants between two or more individuals.
2. People involved in the same situation may behave differently.
3. People have needs which must be satisfied if they are to grow and be physically and mentally well.
4. Anger occurs when a person perceives an external event (object or person) as threatening.

BACKGROUND INFORMATION

Conflicts occur when two or more individuals have different needs, values, and wants. Sometimes people think other persons will act in a certain way, which causes the people to prepare themselves for a conflict. Win or lose situations can cause conflict. Conflicts are often caused when a person is unable to accept another person's point of view. Communication can help clear up these kinds of misunderstandings.

Someone is usually expected to "win," and someone is expected to "lose" when people deal with competition and conflict.

It is sometimes difficult to understand why people react to situations in various ways. For example, in a given situation one person may remain calm while another may get upset and a third may prepare to fight. Understanding other peoples' behavior patterns can assist everyone in making positive decisions about human behavior.

When people perceive that their physical or psychological well being is being threatened, they often become angry. Anger occurs within themselves. Anger is a form of resentment when people have unanswered demands and expectations.

Sometimes people have a right to be angry about things. When there is a justifiable reason for anger, it may inspire people to work for a change when they think something is unjust or wrong.

Some examples of conflict include:

1. Conflicts within yourself.
2. Conflicts of ideas.
3. Conflicts of conscience.
4. Conflicts of desires.

In coping with conflict crises, a person may:

1. Discuss his/her conflict with the people involved (eyeball to eyeball).

BACKGROUND INFORMATION (Cont'd.)

2. Avoid making assumptions but check out the facts.
3. "Slow down" the controversy and remain calm.
4. Desensitize himself/herself and try to be objective.
5. Give thoughtful consideration to the consequences of his/her plan of action.
6. Avoid making snap judgments about people and their statements.
7. Avoid using words that make people angry.
8. Discuss the behavior which is of concern rather than the person.

CURRICULUM OBJECTIVES

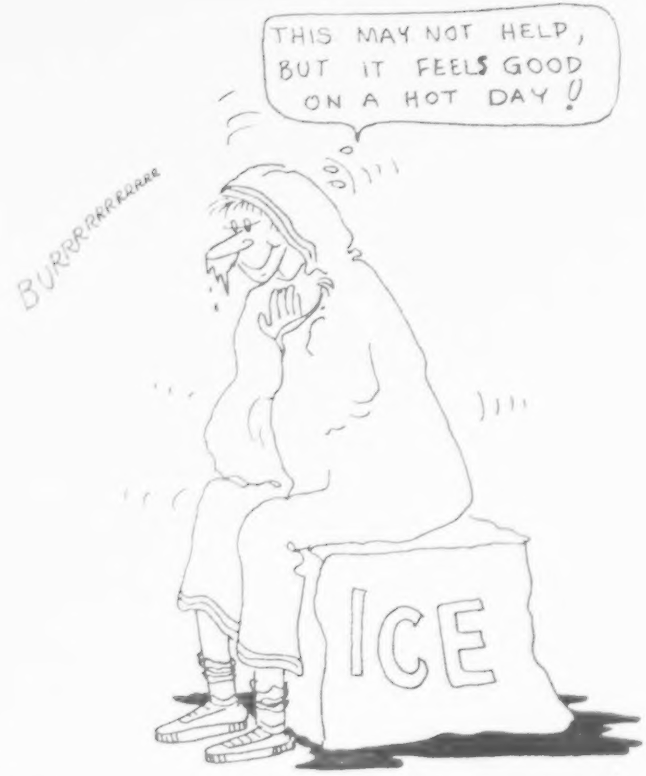
Students will be able to:

1. Explain how conflicts occur when people have different needs, values, and wants.
2. Understand their reactions to conflicts.
3. Define types of conflicts.

4. List methods of coping with conflicts.

"DOING ACTIVITIES"

Refer to sample exercises on the following pages.


THIS MAY NOT HELP, BUT IT FEELS GOOD ON A HOT DAY!
BURRRRRRRRRRRRR
ICE

RULE # 3 "SLOW THINGS DOWN AND KEEP COOL!"

CONFLICT AND PUNISHMENT

Name ______________________________ Date ______________________________

Directions: Ask students to bring to class three newspaper clippings that present a conflict.

Ask the members of small groups to discuss possible ways in which the conflict could be resolved. They are to consider themselves to be a special group, charged with the duty of settling the problem, but avoiding punishment of the parties concerned. What steps should be taken? By whom? Whose cooperation would be needed to achieve a resolution of the conflict? Ask the students to try to be realistic, dealing with the immediate problem and persons involved rather than with the total society!

After about 20 minutes, ask each group to explain its problem and the solution to the class.

In a large group, discuss the use of "punishment" in our society in dealing with conflicts. Such questions as the following may be raised:

- Who is punished in our society? For what? With what results?
- What is the relationship between punishment and correction?
- Do you think it is possible to have a society without any means of punishment? Would such a society have laws? How would they be enforced?
- What are the effects? Are there alternative means of teaching children?
- What are they? Do you think they are effective?
- What is the difference between a parent punishing his/her child and society's punishing a citizen?
- Instruct students to write a brief statement comparing and contrasting "violence" and "aggression."
- Ask students to poll 10 other persons on the question: How should society treat acts of physical violence?
- What kinds of punishment do parents use with their children? Why?

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EMOTIONAL SITUATIONS

Name ______________________________ Date ____________________________

Directions: Place each word in the list below in the category in which you believe it belongs.

To the Teacher: Conduct a class discussion, asking that individuals share the types of situations and events which cause them to have uncomfortable feelings. Members of the group should be given the opportunity to suggest ways in which uncomfortable feeling might be resolved.

	CHECK ONE		
FEELINGS	COMFORTABLE	UNCOMFOTABLE	NOT SURE
1. Capable			
2. Sick			
3. Embarrassed			
4. Love			
5. Trusted			
6. Guilty			
7. Successful			
8. Clumsy			
9. Angry			
10. Joyful			
11. Confident			
12. Insecure			
13. Jealous			
14. Troubled			
15. Noticed			
16. Sad			
17. Upset			
18. Thrilled			
19. Accepted			
20. Smart			
21. Happy			
22. Mixed-up			
23. Frustrated			
24. Bubbly			

CONFLICTS FROM NAME CALLING

Name ______________________ Date ______________________

Directions: Think about the last time someone called you an unpleasant name. Discuss your responses to the following questions:

- Which kind of names do you think hurt people most?
- Why do some names or remarks hurt more than others?
- How do you feel when you are called such a name?
- Why do people call other people names?
- How does a name caller act when he or she does not get a reaction?
- Do people call other persons names just to hurt them? To get a reaction from a person?

Discuss and list some causes of name calling.

____

____

____

Suggest alternative actions one might take when abused by name calling.

____

____

____

Write a paragraph concerning the impact of name calling and the reasons why different individuals are affected differently by this type of insult.

____

____

____

CONCEPTS

1. A value is a pattern of living that is freely chosen after considering the alternatives and consequences.
2. A value is cherished, publicly affirmed, and performed; it enhances the person's total growth.
3. An important aspect of understanding our value system is discovering our self-image.
4. All human beings have basic needs, such as physical needs, security, and belonging.
5. Self-worth and self-fulfillment are secondary needs that help people to enjoy life and make them feel good about themselves.

BACKGROUND INFORMATION

Group standards function as an expression of values and are built from the needs of group members. The teacher should help groups to understand the way in which individuals and group values function in the attainment of goals.

Today, youngsters have greater mobility, more variety, a wilder range of opportunities, and more potential for change than did those of any other period in human history. They ask: "What is life all about?" "Where do I fit in?" "How can I find meaning?"

People are not born with values, and their values are changing continually throughout their lives. Youth need to discover why and how they have developed the values which they possess. Understanding your values helps you to live in closer harmony with your beliefs and helps you to make decisions about the direction of your life. Primary values help you to realize your own value and the value of others.

The method of value clarification emphasizes the freedom of the individual to discover and form his/her own values. The teacher should enable youngsters to discover their own values through exploration of the value process. The intent of this procedure is to build trust and openness in the class and create an atmosphere of personal growth and constructive confrontation of value systems. Students will want to know more about themselves and their values and how to grow as persons. Another goal is to motivate youngsters to act upon their values.

Values are not only a reflection of individual needs but also of the demands of society and institutions.

Abraham Maslow's hierarchy of needs are divided into five parts, as follows:

1. Physical needs (food, water, shelter,

BACKGROUND INFORMATION (Cont'd.)

warmth, activity, and rest).

2. Safety (the need to be safe from harm).
3. Love (the need to be loved and to feel you belong).
4. Self-worth (the need to feel important and to believe that you are a person of worth).
5. Self-fulfillment (the need to achieve all that you can become).

The first three needs cited are considered to be essential. You must fulfill the first three needs before you can go on to the next two.

Raths, Harmin, and Simon (1966) identified seven criteria to determine whether a person is actually holding a value or not. They indicated that a value must be:

1. Freely chosen.
2. Chosen from alternatives.
3. Chosen after consideration of the consequences.
4. Carried out in some way.
5. A pattern of life.
6. Prized and cherished.
7. Publicly affirmed.

Value clarification is a process by which a person can discover meaning and direction in life through recognition of his/her value system. If a value does not enhance a person's life, he/she is lacking one of the criteria listed above.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain and define a value.
2. Define the values which they prize and cherish.
3. List the values which they have freely chosen.
4. Define individual needs that must be fulfilled by their values.
5. List values they would like to acquire and that would enhance the quality of their lives.

"DOING ACTIVITIES"

Please refer to exercises on the following pages.

VALUE SYSTEMS

WHAT DO I VALUE IN LIFE?

Name ________________________ Date ________________________

Directions: 1. Read through the entire list. This is not a semantics exercise; thus, feel free to cross out the descriptive words in parenthese that have no meaning to your personal definition of the term capitalized. Inset other words if you wish. Indicate each item's level of importance to you at this time and place in your life--whether it is "not too important," "important," or "very important." 2. After completing item 1, select and list in the spaces provided the five items which are most important to you and the five items that are the least important.

Adventure (exploration, risks, danger, doing something new and/or untried)
Beauty (in the arts and in nature)
Emotional well being (ability to recognize and handle inner conflict)
Ethical life (responsible living toward self and others, personal honor, integrity)
Family happiness (mutural caring among family members)
Forgiveness (being willing to pardon others, bearing no grudges)
Honesty (being frank and genuinely yourself with everyone)
Law and order (respect for authority, property of others)
Love (warmth, caring and receiving of respect and affection)
Meaningful work (sense of purpose, doing something that is relevant)
Money (plenty of money for things I want)
Personal freedom (independence, making own choices)
Personal power (having influence and authority over others)
Physical appearance (attractiveness--neat, clean, well groomed)
Pleasure (excitement, satisfaction, fun, joy)
Recognition (being important, being well-liked, being accepted)
Religion (religious belief, relationship with God, meaning in life)
Service (devotion to the interests of others)
Skill (being good at doing something important to me and/or to others)
Wisdom (mature understanding, insight, application of knowledge)

Items that are most important to me:

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

Items that are least important to me:

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

WHAT I WANT TO BE LIKE

Name ______________________________ Date ______________________________

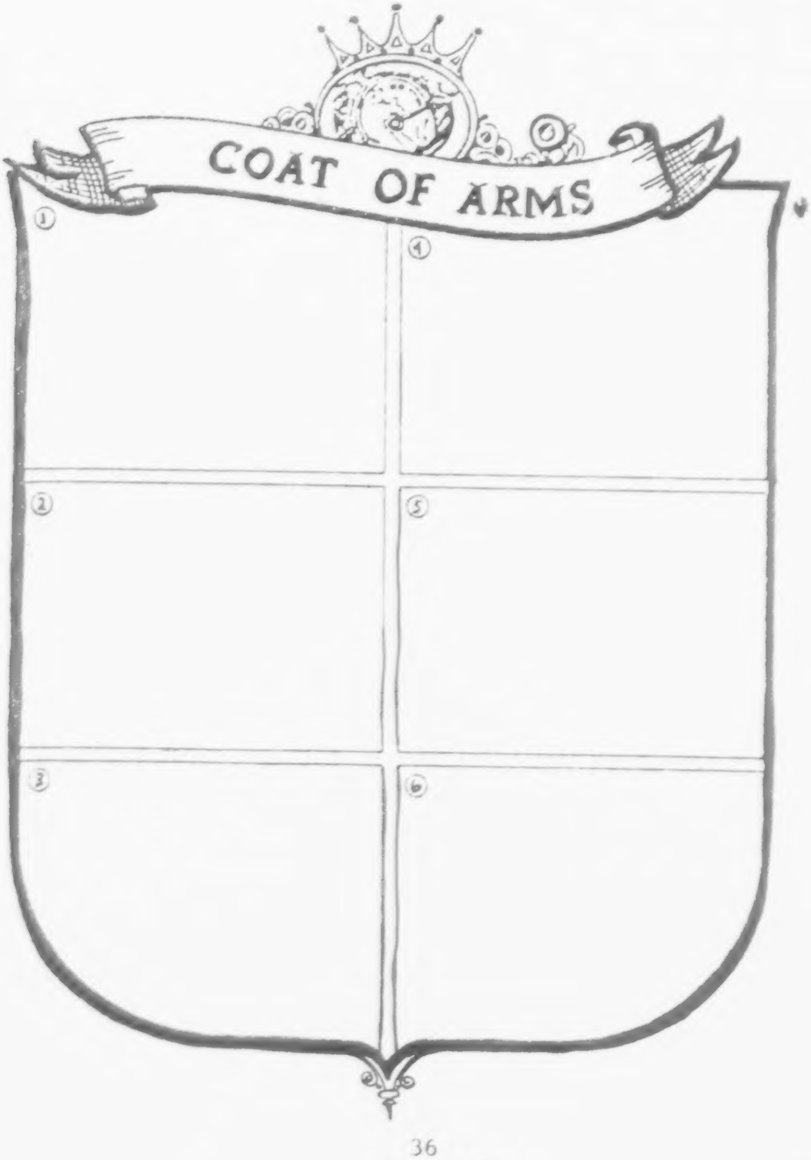
Directions: Circle the numbers of the items below that show how you feel about life.

	Not Very Often	Some Of The Time	Most Of The Time
I would like to be friendly.	1	2	3
I would like to be happy.	1	2	3
I would like to be kind.	1	2	3
I would like to be honest.	1	2	3
I would like to be brave.	1	2	3
I would like to be likeable.	1	2	3
I would like to be trusted.	1	2	3
I would like to be good.	1	2	3
I would like to be proud.	1	2	3
I would like to be lazy.	1	2	3
I would like to be cooperative.	1	2	3
I would like to be cheerful.	1	2	3
I would like to be loyal.	1	2	3
I would like to be thoughtful.	1	2	3
I would like to be jealous.	1	2	3
I would like to be popular.	1	2	3
I would like to be courteous.	1	2	3
I would like to be obedient.	1	2	3
I would like to be polite.	1	2	3
I would like to be bashful.	1	2	3
I would like to be clean.	1	2	3
I would like to be helpful.	1	2	3

YOUR COAT OF ARMS

Name ______________________ Date ______________________

Directions: You will have five minutes to draw a picture or a symbol in each section of your Coat of Arms, which is pictured below. Select six values that you cherish. Draw a picture of one value in each of the spaces. Be ready to explain the values that you have selected to your class. Do not worry about artistic ability--it is the value which you are depicting that matters.



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CONCEPTS

1. Dislikes are often based on reasons that are natural and acceptable.
2. Prejudice means disliking something or someone without having personal knowledge or erroneous information about the thing or person.
3. Communities are made up of people of different nationalities, races, and religions with different attitudes based on their likes, dislikes, and prejudices.
4. Sometimes people are prejudiced toward someone or something because the people think they will act or be a certain way.
5. All human beings are unique individuals with separate, distinct personalities. People should not generalize about them nor prejudge them.

BACKGROUND INFORMATION

Many communities are made up of people of different nationalities, races, and religions. The people in these communities have different attitudes that are based on their likes, dislikes, and predudices.

When based on reason, a person's dislikes may be natural and acceptable.

Prejudice is prejuding on the basis of stereotypes and/or second-hand impressions, which people have allowed to cloud their judgment and understanding. Prejudice prevents interaction with people. Empathy requires involvement.

Since people are all different in their attitudes, their differences sometimes trigger a negative response from another peoson. If prejudicial attitudes can be decreased, the feeling of self-worth can be increased.

No group can be healthy when a significant number of its members feel insecure about their own status, and there is an atmosphere of insecurity about their friends, homes, and jobs.

When they have experienced prejudice themselves, young people are likely to be aware of the unhappiness caused by being rejected. However, they tend to counter this situation by finding a group in which they can be accepted.

Each person must think well of himself/herself and feel that he/she is significant. A principle motive for prejudice is to "be better than others." People often use prejudice to gain a personal or political advantage.

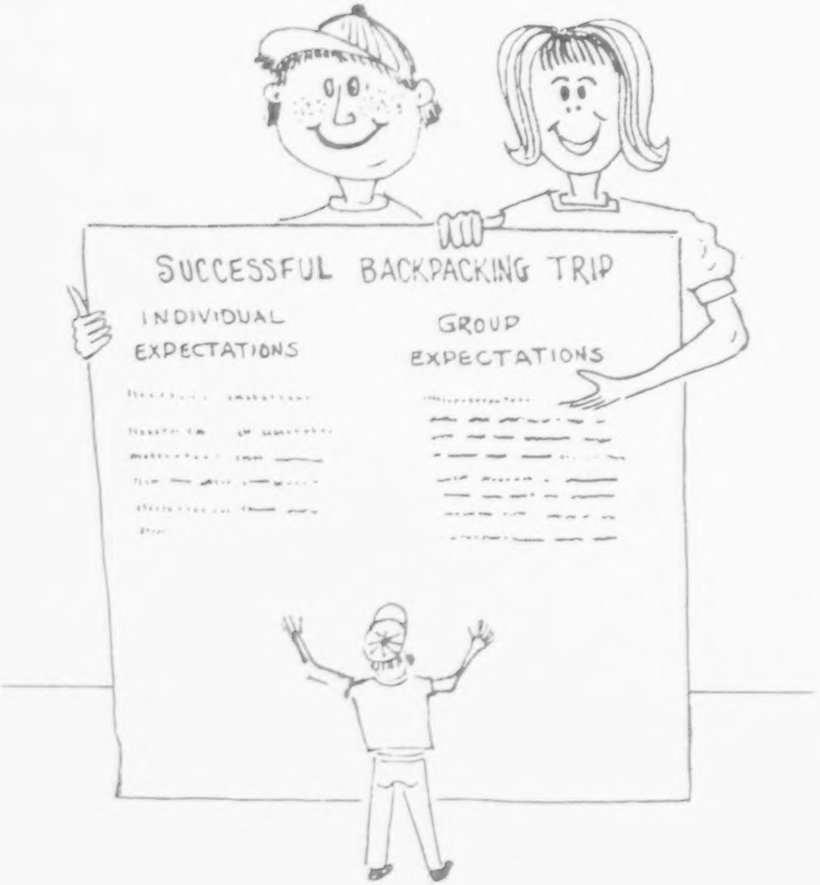
CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize and identify the physical traits which make themselves alike and different from other students.
2. Use self-assessment techniques as tools for developing self-awareness.
3. Define a feeling and an emotion and describe ways of expressing them.
4. Identify feelings as related to an event or situation on the trail.
5. Describe individual and group expectations for a successful backpacking trip.

"DOING ACTIVITIES"

Please refer to sample exercises on the following pages.


SUCCESSFUL BACKPACKING TRIP
INDIVIDUAL EXPECTATIONS
GROUP EXPECTATIONS

DO YOU KNOW ME?

Name ______________________ Date ______________________

I am a person who...

likes ______________________

hates ______________________

can ______________________

cannot ______________________

would never ______________________

loves to ______________________

wants to learn how to ______________________

used to be afraid of ______________________

would be better off if ______________________

is really good at ______________________

gets really angry when ______________________

has the good habit of ______________________

has the bad habit of ______________________

wishes I could change the way I ______________________

wishes I could change the way other people ______________________

never misses watching a favorite TV show ______________________

will someday ______________________

RIDICULE

Name ______________________ Date ______________________

Directions: Ridiculing is a way of hurting someone's feelings. This activity will help you to recognize that no one likes to be ridiculed. Complete the following sentences about how you feel.

When someone laughs at me, I feel ______________________.

When people don't take what I say and do seriously, I feel ______________.

When people talk about me or someone in my family in order to hurt my feelings, I want to ______________________.

When people tell lies about me or my family, I want to ______________.

If someone kicked or spat on me, I would ______________________.

People who make fun of other people are ______________________.

People who try to understand the feelings of others are ______________.

What does ridicule mean? ______________________

____

Is ridicule designed to hurt or help people? Explain. ______________

____

Are there things about people that others ridicule which cannot be changed or helped? Explain by giving examples. ______________________

____

Are there things about you which others laugh at but which you cannot control?

____

Are there things about you which others laugh at but which you would like to change?

____

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PHYSICAL DIFFERENCES

Name ______________________ Date ______________________

Directions: All human beings have physical differences, just as do other living things. Sometimes people are prejudiced toward persons who are different physically. Answering the following questions will help you to recognize that you should not like or dislike a person because of his/her physical differences:

1. How many colors of people are there in the world?

   a. (red) ______________ ______________
   b. (yellow) ______________ ______________
   c. (brown) ______________ ______________
   d. (black) ______________ ______________
   e. (white) ______________ ______________

2. How many colors are in your class? ______________

3. What color are you? ______________

4. How many colors of eyes are there in the world? ______________

5. What color are your eyes? ______________

6. How many types of hair do people have?

   a. (straight) ______________
   b. (curly) ______________
   c. (wavy) ______________

7. Young people are of various colors, sizes, and shapes. Explain why or why not people should let physical differences be a determining factor in measuring a person's worth.

____

____

____

____

MY ETHNICITY

Name ______________________________ Date ______________________________

Directions: Each of us is an individual. Each of us is unique. However, as human beings, we all have certain needs, which are satisfied in a variety of ways. Each of us has a physical and environmental heritage from our parents and other members of our ancestral group. This physical and environmental heritage contributes to our uniqueness and individuality and may be called our ethnicity. (Some examples are skin color, religion, language, and preferences in foods.)

Complete the following statements about yourself. Write complete sentences.

1. I belong to ______________________________ ethnic group.
2. The language of my ethnic group is ______________________________.
3. Some foods associated with my ethnic group are ______________________.
4. Some types of clothing associated with my ethnic group are ______________.
5. Some types of music credited to my ethnic group are __________________.
6. Some games in which my ethnic group participates are _________________.
7. Some customs and traditions of my ethnic group are __________________.
8. Some holidays celebrated by my ethnic group are _____________________.
9. The religions of my ethnic group are ______________________________.
10. Some dances associated with my ethnic group are _____________________.

CONCEPTS

1. As people learn about themselves, their values, their uniqueness, and their other special qualities, they are better able to accept and appreciate others.
2. Human differences are related to socioeconomic levels, religious orientation, beliefs, and temperament.
3. Human differences and similarities are better recognized from associations and activities in the classroom and from on-the-trail experiences rather than from textbooks.
4. Each individual has emotions and feelings and may express them in different ways.
5. Successful interaction hinges on the development of accurate expectations of others and from the development by others of accurate perceptions of ourselves.

BACKGROUND INFORMATION

It is generally acknowledged that people are more alike than they are different because they belong to the human family. All members share similar fundamental anatomical structures and physiological needs.

Feelings form the foundation of the experience and knowledge that enable individuals to develop greater skills as they progress to higher levels of humaneness.

The first step toward improving humaneness is the development of respect and understanding for individual differences. Our differences are related to ideas, beliefs, values, and attitudes.

Differences are important because they reflect the individual's self-perception and the individual's behavior toward other persons.

People can better understand the world when they are aware of human differences. Students should know that it is all right for people to have differing beliefs. This knowledge decreases the likelihood of their developing prejudices against beliefs which the students consider to be strange.

Many people worry about "being different" when they should realize that each person is unique and should be expected to vary in character traits, likes and dislikes, abilities, interests, and life styles. Some students have the idea that society should be devoted to the stamping out of differences. Such attitudes are unfortunate not only in the way students see others, but also in the way they perceive themselves.

Students may have an intolerance of the "differences" of others and a tendency to reject the outsider; they may also adopt

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BACKGROUND INFORMATION (Cont'd.)

clothing and behavior which may help them to identify with their chosen group.

Human social relations would be impossible if people did not develop working predictions about other persons. Without expectations, people would live in a highly unpredictable and threatening world because, each time they interacted with others, they would be unable to predict how others would react.

As students interact or work together on the trail, they must develop expectations for every other member of the group if they are to accomplish the personal and group goals. The achievement of such goals rests on each member being able to predict and adjust to the actions of every other member.

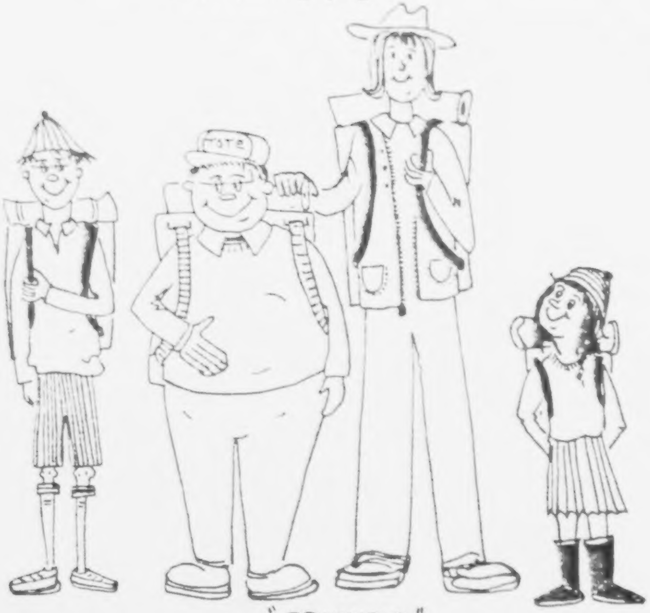
CURRICULUM OBJECTIVES

Students will be able to:

1. Explain how humans are alike physically and in life styles.
2. Explain why it is important to preserve individual differences in a democratic society.
3. List problems that may be encountered on the trail because of individual differences among members of the group.
4. Develop solutions to problems, dislikes, and prejudices that may effect achievement of the goals of the group.
5. Describe how individual differences are important to our self-perception and our behavior toward other humans.

"DOING ACTIVITIES"

Please refer to sample exercises on the following pages.



"FRIENDS"

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LISTING HUMAN NEEDS

Name ______________________________ Date ______________________________

Directions: Make a list of all the things that you think are essential for living. Consider your physical and feeling needs.

Take a survey among several persons, asking each one to list several needs which he/she considers to be essential to living. Persons being interviewed may suggest additional needs.

Ask students to form small groups, and to review the data and to list the 10 most common needs.

Circulate your sheet to at least five other students, asking them to write their names and to specify whether they agree or disagree that each them listed is an essential need. Share the results with the class.

AGREE	DISAGREE	ESSENTIAL NEEDS	NAME				
		1.					
		2.					
		3.					
		4.					
		5.					
		6.					
		7.					
		8.					
		9.					
		10.					
		11.					
		12.					
		13.					
		14.					
		15.					

WHAT ARE YOUR CHARACTERISTICS?

Name ______________________________ Date ______________________________

Directions: Circle one number for each set of characteristics that best describes you on the "self-perception rating" form. Second, fold the paper so that your partner can record his/her perception of you without seeing your rating. Third, compare the differences between your self-rating and the perception rating of your partner.

To the Teacher: The discussion questions will help students understand the nature of self-perception and the perceptions of others. Which perception is the "true" or "real" perception? Why do people view us differently than we view ourselves? Is it necessary that our self-perceptions and the perceptions that others have of us match? Which perception is more important?

The personality characteristics or traits listed below are all treated as through they are of equal value. One characteristic is not better than another. How well each characteristic serves the individual is most important. For example, a person who is reserved can be just as much fun to be with as a person who is outgoing. A timid person enjoys new experiences as much as an adventuresome person does.

Self-Perception Rating

RESERVED	1	2	3	4	5	6	7	OUTGOING
SERIOUS	1	2	3	4	5	6	7	HAPPY GO LUCKY
TIMID	1	2	3	4	5	6	7	ADVENTURESOME
TOUGH-MINDED	1	2	3	4	5	6	7	SENSITIVE
TRUSTING	1	2	3	4	5	6	7	PROBING
CONSERVATIVE	1	2	3	4	5	6	7	EXPERIMENTING
DEPENDENT ON OTHERS	1	2	3	4	5	6	7	SELF-SUFFICIENT
RELAXED	1	2	3	4	5	6	7	TENSE
PRACTICAL	1	2	3	4	5	6	7	IMAGINATIVE

Partner's Perception Rating

RESERVED	1	2	3	4	5	6	7	OUTGOING
SERIOUS	1	2	3	4	5	6	7	HAPPY GO LUCKY
TIMID	1	2	3	4	5	6	7	ADVENTURESOME
TOUGH-MINDED	1	2	3	4	5	6	7	SENSITIVE
TRUSTING	1	2	3	4	5	6	7	PROBING
CONSERVATIVE	1	2	3	4	5	6	7	EXPERIMENTING
DEPENDENT ON OTHERS	1	2	3	4	5	6	7	SELF-SUFFICIENT
RELAXED	1	2	3	4	5	6	7	TENSE
PRACTICAL	1	2	3	4	5	6	7	IMAGINATIVE

WHAT ARE YOU LIKE?

Name ______________________ Date ______________________

Directions: Circle the parts of the sentences below that express your feelings. How is your answer different from that of your partner?

Are you: More like a rose or a daisy?
More like breakfast or dinner?
More like summer or winter?
More like a teacher or a student?
More yes or no?
More like the country or the city?
More a leader or a follower?
More of an arguer or an agree-er?
More like a gourmet or a MacDonald's fan?
More like a motorcycle or a skateboard?
More like a balloon or a kite?
More like a hummingbird or an eagle?
More like a caterpillar or a butterfly?
More like a frozen yogurt or an ice cream?
More like Saturday or Wednesday?
More like morning or night?
More like a Bionic person or the Fonz?
More like a beach or the mountains?
More like tennis shoes or boots?
More like walking or running?
More like reading or P.E.?

Discussion: What did you find? Did everyone make the same choices? How often did your best friend in the class choose the same thing as you? Is this good or bad? Why? We are all special (unique), even in making choices. Still, we can be friends and work together, respecting our differences and similarities.

HUMAN DIFFERENCES

WHO AM I?

Name ______________________ Date ______________________

Directions: Complete the following sentences, and discuss your feelings with the members of your group.

1. In general, school ...
2. My best friend ...
3. I don't like people who ...
4. I am at my best when ...
5. Right now, I feel ...
6. People I trust ...
7. The best thing that could happen to me would be ...
8. When I don't like something I've done, I ...
9. When I'm proud of myself, I ...
10. I'm very happy that ...
11. I wish my parents knew ...
12. Some day I hope ...
13. I would like to ...
14. I like myself because ...
15. Physical changes I would make in myself are ...
16. Physical characteristics I would not change are ...

CONCEPTS

1. Success or failure sometimes depends on the person's ideas and feelings about work, money, values, and him-self/herself.

2. To be successful, a person must develop self-confidence, poise, and a positive self-image.

3. Most success and progress have come about when there has been a need to cooperate and eliminate contention, strife, bitterness, and hatred.

4. The business of life is to succeed and not to waste it in failure.

5. Successful people do that which gives them a feeling of self-worth and a feeling that they are worthwhile.

BACKGROUND INFORMATION

Educators must help students to achieve success in living and working together peacefully in a complex and interdependent world. Students must grow in ways that will improve the "quality of life."

In striving for success, students must possess positive attitudes, industry, courage, dependability, thoughtfulness, and planning ability. Successful people learn how to face reality, be responsible, and have a sense of right and wrong.

To overcome failure and achieve success, people must learn to correct themselves when they are wrong and accept credit when they are right. Each day, people are continuously forming attitudes, values, and opinions, and ways of doing, thinking, and feeling which determine their success or failure.

One of the greatest powers that people develop is habit. It seems to be stronger than discipline or will power. Five important habits are studying, working, thinking, engaging in recreation, and planning. Habits must be practiced to become part of a person's real life.

A true test of the ability to succeed is the ability to endure. It is the quality of always "being there," of always being dependable, and of always being about to see a task through to completion. Successful completion of a project helps to develop a positive self-image and sense of feeling worthwhile. Many experiences will be shared by class members when they discuss their ability to endure the problems encountered during a backpacking trip.

A fine line can sometimes make the difference between failure and success. People must learn to set up definite goals and not to allow obstacles to arise which may

BACKGROUND INFORMATION (Cont'd.)

lead to failure. To be successful, a person must develop the ability to look ahead and to judge his/her own situation in terms of future consequences.

Students must be successful in their first adventure in backpacking if they are to develop an understanding of the natural environment. If they have negative experiences because of their lack of training and skill, the project will not attain its goals.

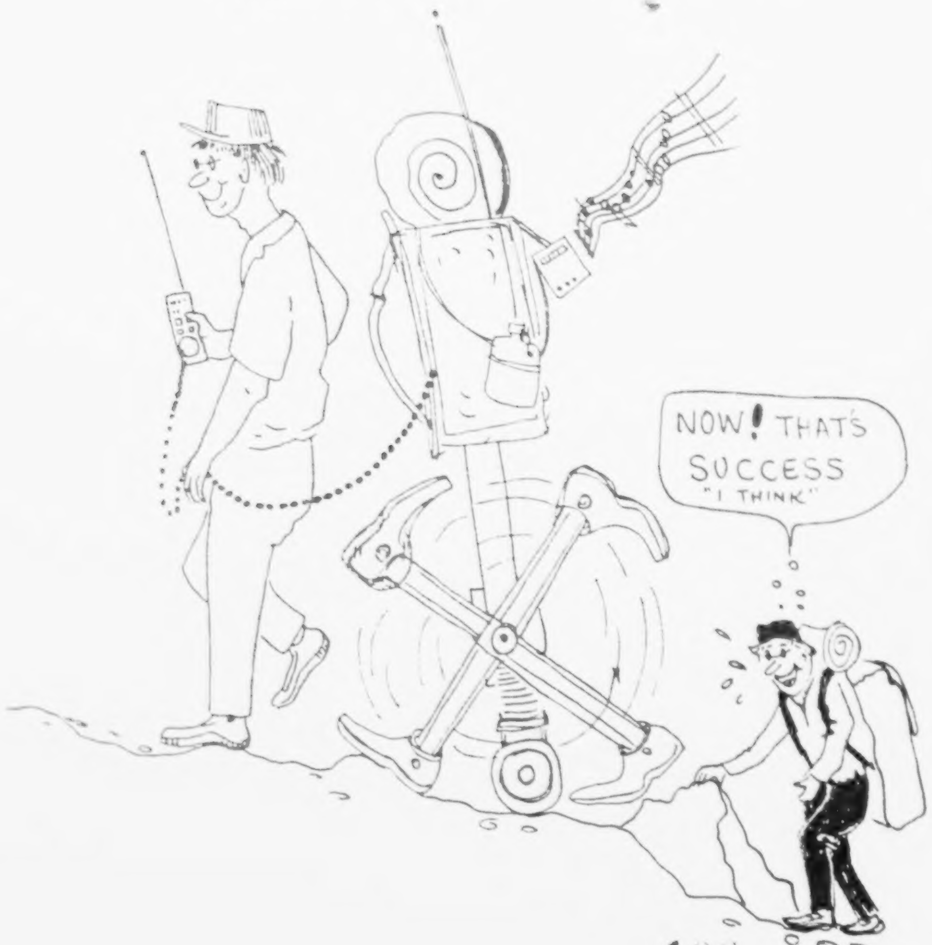
CURRICULUM OBJECTIVES

Students will be able to:

1. Define failure and success.
2. List the qualities that a successful person should have.
3. Define goals that will help to make classroom and backpacking experiences successful.
4. List problems that may cause the project to fail.
5. Explain how planning, attitude, and endurance will enhance the chances of success.

"DOING ACTIVITIES"

Please refer to sample exercises on the following pages.


NOW! THAT'S SUCCESS "I THINK"

FAILURE OR SUCCESS

COMMUNICATING THROUGH MY JOURNAL

Name ______________________ Date ______________________

Directions: Keeping a journal offers an opportunity to record your feelings and ideas in a form that will help you to evaluate your value system. Write your responses to the following questions in your journal. These entries are only for your use unless you wish to share them with someone. You may wish to refer to your journal in explaining your value system during class discussions.

Journal Topics

1. How do you gain acceptance?
2. How do you show acceptance?
3. Who is the most accepting person you know?
4. What does it take for you to feel accepted by someone?
5. When do you feel accepted?
6. When do you feel unaccepted?
7. How do you get what you need?
8. What do children need from parents?
9. What do parents need from children?
10. What do teachers need from students?
11. What do students need from teachers?
12. When do you feel most okay about yourself?
13. When do you feel foolish about yourself?
14. What do you like about yourself?
15. What would you like to change about yourself?
16. What do you want your best friend to be like?
17. What makes you feel secure?
18. What are some fears you have?
19. When are you patriotic?
20. What would you do if your were president of the country?
21. What is a positive thought that keeps coming back to you?
22. How do you like to celebrate?
23. When are you courageous?
24. When do you get jealous?
25. What makes you very angry?
26. How do you show your anger?
27. What bugs you?

WHAT ABOUT IT?

Name ______________________ Date ______________________

Directions: Read each of the following statements. Write "yes" in the space before it if you believe the statement is true. Write "no" if you consider the statement to be false. Discuss your answers with your group. Ask one member of your group to report to the class.

__________ 1. It is natural to get discouraged.

__________ 2. It is important to feel needed.

__________ 3. Must everyone feel important?

__________ 4. Do things or people puzzle you?

__________ 5. To be excited is to be happy.

__________ 6. Kids can expect to have hurt feelings.

__________ 7. Angry people make others angry.

__________ 8. It is easy to tell if people like you.

__________ 9. You either feel accepted or rejected, not both.

__________ 10. Only weak people express love for others.

__________ 11. Losing hurts.

__________ 12. To be courteous to others is a sign of weakness.

__________ 13. Teasing makes people unhappy.

__________ 14. Being successful is a good feeling.

DO YOU AGREE WITH ME?

Name ____________________________ Date ____________________________

Directions: Fill out the form below about how you feel concerning yourself. Select another student to react to your answers and to see if he/she agrees or disagrees with you. This exercise will help you to obtain another personal point of view as to how others feel about you.

DO YOU AGREE		
YES	NO	
		1. In the spaces below, write five major strengths (talents, abilities, or skills) that you feel you possess. a.
		b.
		c.
		d.
		e.
		2. List at least three major values that you live by and demonstrate in your life on a consistent basis. a.
		b.
		c.
		3. List three areas in which you need to grow in order to become a fully - functioning person. a.
		b.
		c.
		4. List three main obstacles, blocks, or inhibitors of growth that you need to overcome in order to become a successful person. a.
		b.
		c.

FAILURE OR SUCCESS

OUR PYRAMID FOR SUCCESS

Directions: Rate yourself in the following areas. See where you need to improve to be more successful in school. Review your ratings by writing N, S, or O in the upper left-hand corner of each box.

N - Need to improve
S - Satisfactory
O - Outstanding

☐ SUCCESS
To do your best because you have prepared yourself. The desire to share your talents for the improvement of others.

☐ TRUST
To be true to the faith others have in you.

☐ CONFIDENCE
The feeling you get when you know you are preparing and trying to do your best.

☐ INITIATIVE
To have the desire to succeed in life.

☐ ENTHUSIASM
To help others share your joy and desire to seek knowledge.

☐ HUMBLENESS
To realize that others have helped to mold your character. Realize that you owe a debt to others.

☐ SKILLS
To discover and develop natural abilities. To have a desire to learn.

☐ CONDITION
To get the proper rest, exervise, and diet. Keep your mind active. Take time to THINK.

☐ FRIENDSHIP
To realize that all people can add something to your life. To have a friend, you must be a friend.

☐ ALERTNESS
To be constantly awake to learn and to develop your ability. Learn from life around you.

☐ FAITH
To believe in yourself and others.

☐ HONESTY
To refuse to lie, steal, or deceive. Be honest with yourself and others.

☐ INDUSTRIOUSNESS
To have a willingness to work hard and to plan your life carefully.

☐ SELF-CONTROL
To control your actions in order to get the most out of learning.

☐ INTENTNESS
To be determined to reach your goal and to face all challenges that will come your way.

NOTE: THIS IS A SAMPLE. Students should develop their own "Pyramid for Success." Students should be encouraged to write their own definitions for each character-building block. This may also be used in a bulletin board display for a class project.

BEST COPY AVAILABLE

CONCEPTS

1. Friendship can be formed through interactions while sharing experiences.
2. It is important to understand the factors that make desirable companions.
3. Respect is an attitude and an action conveyed to individuals or group members.
4. Identifying feelings in particular situations is the first step in understanding people.

BACKGROUN INFORMATION

People need other people. Interaction among people adds meaning, fulfillment, and understanding to life. People's lives are enriched by the sharing of common experiences. This project is designed to provide common, new, and vicarious adventures for youngsters. After they participate in a weekend backpacking trip, time should be provided for sharing new hopes, horizons, reflections, contemplating, reassessments, and friendships.

Friendship is the basis of caring, feeling, and sharing your life with someone. Learning to care for another human being is the greatest challenge in human experience because of the moral and psychological demands. Caring for another person places concern for others on an equal plane with concern for ourselves.

The way in which a student feels influences the manner in which he/she presents himself/herself, how he/she relates to others, and how he/she behaves in a total sense. Messages of feeling are always being communicated. Feelings are also communicated nonverbally (facial expression, body posture, and voice tone). Sometimes people are not completely honest and open in communicating their feelings.

Students need to be aware of the uniqueness of their feelings, emotions, and values and how these traits differ and should be respected in others.

CURRICULUM OBJECTIVES

Students will be able to:

1. Employ social skills in developing friendships.
2. Identify skills of group participation in this course.
3. Practice group participation skills.
4. Analyze the effectiveness of their own behavior in the classroom and in the camping group.

"DOING ACTIVITIES"

Please refer to sample exercises on the following pages.

A PYRAMID OF COMMUNICATION

Directions: Below, you will note a pyramid of 11 blocks. Each block contains a statement which describes things that people can do to get along well with one another. In "building" the pyramid, the number of each block will be called out. As the number is called, each individual will offer to autograph the block of another person. In so doing, he/she will look the other person in the eye and repeat the statement given in the block. After the statement has obtained a signature in the block and has signed the block of another person, he/she should sit down or move to the side of the room. Only one autograph may be given and received. This procedure assures that each person will have an opportunity to receive and convey an expression of praise.

11 You are a worthy person, I admire you.

9 You can count on me to be helpful.
10 I value your friendship.

8 You can trust me.
7 I would like to know you better.
6 I see you as a kind person.

1 You can have faith in me.
2 I will be honest with you.
3 I would work well with you.
4 I have confidence in you.
5 I would like to be your partner on the hike.

RESPECT WINS FRIENDSHIP

HOW DO YOU FEEL ABOUT YOURSELF?

Name ______________________________ Date ______________________________

Directions: Circle the numbers below that shows how you feel.

	Not At All	Some Of The Time	Most Of The Time
I am friendly.	1	2	3
I am happy.	1	2	3
I am kind.	1	2	3
I am brave.	1	2	3
I am honest.	1	2	3
I am likeable.	1	2	3
I am trusted.	1	2	3
I am good.	1	2	3
I am proud.	1	2	3
I am lazy.	1	2	3
I am loyal.	1	2	3
I am cooperative.	1	2	3
I am cheerful.	1	2	3
I am thoughtful.	1	2	3
I am popular.	1	2	3
I am courteous.	1	2	3
I am jealous.	1	2	3
I am obedient.	1	2	3
I am polite.	1	2	3
I am bashful.	1	2	3
I am clean.	1	2	3
I am helpful.	1	2	3

MAKING A BUG LIST

Name ______________________________ Date ______________________________

Directions: Participate in a discussion concerning "bugging behavior." To stimulate the discussion, respond to questions like the following:

1. What does it mean when someone says that he/she is being bugged?
2. Is it fun to be bugged?
3. How do you feel when someone is bugging you?
4. Do you feel friendly to people that bug you?

Make a like of the "five things" that bug you the most. After the list is completed, rank your "bothersome bugs" from one to five, identifying the most bothersome as number one. List your "number one bug" on the chalkboard, and sign you same so that it may be identified.

Discuss such topics as the following:

1. What might you do to let people know that they are bugging you?
2. What might you do to stop people from bugging you?
3. Can you think of anything you do or say that might bug others?

Prepare a "Don't Bug Me by ________________" posters. Also make a "Don't Bug Me" badge, and write on it your "number one bug."

DOES IT BUG YOU?

Name ______________________________ Date ______________________________

Directions: Circle the five things listed below that bug you the most. On the back of this sheet, write five things that you think bug the teacher the most.

Does it bug you if someone does the following:

Acts bossy.
Acts silly all the time.
Talks a lot.
Never talks.
Has to have his/her way all the time.
Is smarter than you are.
Won't let you borrow things.
Can do thinks that you have trouble with.
Has nicer clothes than you.
Doesn't know how to dress.
Is a sloppy dresser.
Isn't clean.
Loses his/her temper a lot.
Cries a lot.
Calls you names.
Always pokes or hits at you.
Tells secrets to another student while you are around.
Is always looking at you.
Is always "tattling" to the teacher.
Answers a lot of questions in class.

DON'T SET OFF MY ALARM

Name ______________________________ Date ______________________________

Directions: Develop your own list of things that set off your alarm (cause disputes or make you angry).

Write on the chalkboard places or situations that set off alarms, start fights, or cause other stress problems. The following are examples that may be used to start a discussion:

1. In class while working in a group.
2. Working individually on a task in class.
3. While going to and from school.
4. While hiking on the trail.
5. While performing group tasks in camp.

On the chalkboard, write the five place headings and then list them under all the things that the students indicate "set off their alarms." Form five student groups so that each group may be randomly assigned one place category.

Each group should use the lists in its category to illustrate a poster which warn people not to "push their alarms." Use the following as an example and rank the alarms in the order of their importance:

DON'T PUSH OUR BUTTON

by

○ Calling us names.
○ Pushing us.
○ Acting bossy.
○ Acting stuck up.
○ Not doing your tasks.
○ Forgetting to complete assignments.
○ Teasing us.

Color in red the "buttons" or circles of the three most important alarms. Color in orange the three next most important; next, use yellow, and so on.

While students are making their posters, the teacher might also prepare one about his/her alarms.

CONCEPTS

1. A group needs to recognize its own need in order to reach common goals.

2. Rules are established to protect the members of the group.

3. The word and honor of the individual member determine the worth of the group.

4. Protecting the rights of others is an individual responsibility which contributes to the well being of the group.

BACKGROUND INFORMATION

A "Code of Honor" helps students to understand that a meaningful society must provide for basic human needs and recognize the importance of the individual. A code also helps the student to realize that the individual must develop constructive attitudes toward authority and accept responsibility for his/her personal welfare and for that of the group.

Freedom for the individual can only exist if it does not interfere with that of other members of the group. The complexity of social order demands that students understand the reasons for the various forms of authority. Students must realize that authority is a stabilizer on the trail and in the classroom. It is important that students develop their own "Code of Honor" for functioning in the classroom and on the trail.

Rational people do not wish to live in a lawless world. The teacher should help students assess the requirements of the situation. The T.O.T.E. project provides many opportunities for students to develop their own codes of behavior and to realize how they will live together as a group in the classroom and on the trail.

A responsible person does that which gives him/her a feeling of self-worth; can be trusted to live up to his/her word; and wants to be helpful to others. An irresponsible person may or may not do what he/she says, depending on how he/she feels, the amount of effort that must be put forth, and "what is in it" for him/her.

CURRICLUM OBJECTIVES

Students will be able to:

1. Develop a "Code of Honor" for the classroom and on the trail that protects the group welfare.

2. List the various types of authority under which they function as an individual (national, state, local, school, and parental authority).

3. Describe how laws operate to protect individuals.

CURRICULUM OBJECTIVES (Cont'd.)

4. Explain who has the responsibility to enforce the rules.
5. List reasons why a person should or should not be required to keep his/her word.
6. Describe a rational rule.
7. Describe a rational person.

"DOING ACTIVITIES"

1. Develop a "Code of Honor" for the classroom and the trail that protects the welfare of the group.
2. Set up a system to enforce the rules.
3. Prepare guidelines that describe a rational rule.
4. Prepare guidelines that describe a rational person.
5. List the reasons why people should or should not keep their word.
6. Develop a "Trail Users' Code of Ethics."

THAT "TRAIL USERS' CODE OF ETHICS"......... MAKES CAMPING MORE FUN!
HOME

TRAIL USERS' CODE OF ETHICS

Name ______________________ Date ______________________

Directions: Develop a "Trail Users' Code of Ethics" for you backpacking trip. Below is a sample.

1. I will appreciate the solitude and beauty of the trail and the surrounding environment. I will respect the feelings of others toward it.
2. I will do my best to preserve the natural and historic features which attracted me to the trail.
3. I will not disturb plants or wildlife along the trail.
4. I will use only established campsites and rest areas when available.
5. I will reduce the litter problem by carrying out all that I carry in and more.
6. I will take care to conserve the improvements that have been made along the trail.
7. I will use a trail only for its designated purpose.
8. I will not promote activities or create situations that disturb others.
9. I will promote the use of maps, educational materials, and equipment that will help trail users achieve maximum enjoyment.
10. I will exercise utmost care with fires.
11. I will not exceed my physical or technical capabilities and will travel equipped to meet emergency situations.
12. I will treat property of others with the same care that I would give my own property by not entering posted land, by observing laws and regulations, by discouraging violations of them, by getting permission before entering private property, and by not disturbing livestock nor passing over cultivated fields.
13. I will always leave a campsite in better condition than I found it.

POSITIVE QUALITIES

Name ______________________ Date ______________________

Directions:

1. Divide the class into dyads. Inform class members that for the next five minutes they will participate in an exercise in nonverbal communication. Each person is to convey to his/her partner what he/she thinks is his/her own most positive quality. There are no restrictions regarding the type. Discourage questions. Remind students that the task must be performed without talking and should be "spelled out," as in some versions of charades, but conveyed nonverbally. No one is to speak until you give the signal. Call time when your dyads "run dry."

2. The members of each dyad discuss what they were trying to convey. Circulate among the groups and, if necessary, emphasize that this part of the exercise is to concentrate on the positive--the good qualities, whatever they are. At this point, no one should talk about any qualities he/she dislikes in himself/herself or others.

3. Instruct each person to record on a slip of paper, a brief description--one word, if that is adequate-of the quality expressed by his/her partner. Neither his/her name nor the partner's name is to be placed on the paper.

4. Collect and shuffle these slips and re-distribute them to the class. Ask each class member to think about the question, "How does a self-confident, poised person actively demonstrate this quality in interaction with another person?"

5. Ask the members of the dyads to discuss the qualities written on the slip of paper. They should plan a brief skit or a role-playing situation in which they demonstrate to the class both qualities.

CODE OF HONOR

HOW DO YOU REACT?

Name ______________________ Date ______________________

Directions: Read each of the following statements and then indicate the extent to which you believe it applies to you.

		Hardly Ever	Sometimes	Most Of The Time
1.	Praises someone when he/she does well.			
2.	Puts out a foot to bother or trip someone.			
3.	Cuts in line at the drinking fountain.			
4.	Picks up something for another person when he/she drops it.			
5.	Waves his/her hand when others are talking.			
6.	Yells at someone when he/she makes a bad play.			
7.	Listens and tries to understand what others are saying.			
8.	Makes smart remarks to others.			
9.	Chosen by classmates as a leader.			
10.	Observes how others feel about something.			
11.	Says "please" and "thank you."			
12.	Likes to gripe.			
13.	Finds fault with others.			
14.	Wears a smile.			
15.	Brags about things.			
16.	Passes out compliments.			
17.	Has lots of friends.			

Review your responses, and then complete the following statement:

I could be a better person by

1. ______________________
2. ______________________
3. ______________________
4. ______________________
5. ______________________

This activity may be concluded by asking students to suggest the kinds of relationships that would make the class more enjoyable. The responses could be posted on a bulletin board as class goals.

CONCEPTS

1. Student discussions of moral dilemmas stimulate a healthy development of moral reasoning and judgment.

2. Consideration of moral dilemmas helps students to focus their thinking on moral conflict through a personal experience or a specific situation.

3. Sharing diverse moral opinions helps students to clarify and reiterate their own convictions.

4. Discussions of moral reasoning expose students to ideas and viewpoints of other as they relate to moral responsibilities, customs, habits, and obligations.

BACKGROUND INFORMATION

A "trail dilemma" is a conflict situation in which what is right or wrong is not clear-cut or obvious. A tril dilemma must involve a specific situation that is important to the group or individual.

Resolving dilemmas is most effective when:

1. Both sides appear to be reasonable.

2. The situations involves moral issues or value judgments.

3. Real-life experiences are involved.

4. Discussions require students to think more deeply about the moral or ethical issue.

Discussions of dilemmas are effective teaching tools when:

1. The dilemma is understood by all students.

2. The dilemma has a genuine moral conflict.

3. Students have time to build arguments and take firm positions on the specific issues.

4. There is a climate of fairness and justice within the group as a whole.

5. Students use the reasoning process to resolve inconsistencies and inadequacies in the discussion.

6. The teacher assumes that all sides of the issues are presented and understood by the students.

7. Students arrive at a fair and just decision.

In the "Doing Activities" there are examples of moral dilemmas that will help students understand the process. One of the best ways to clarify values is to involve class members in discussing their own dilemmas that occur in the classroom or on

BACKGROUND INFORMATION (Cont'd.)

the trail.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe a moral dilemma on the trail.
2. Understand how to use moral dilemmas as a process for developing moral reasoning and judgment.
3. Identify their own moral dilemmas based on personal experiences in the classroom and on the trail.
4. Be able to write a description of a dilemma on the trail for classroom use.

"DOING ACTIVITIES"

Please refer to samples of exercises on the following pages.

WE SURE TOOK CARE OF ALL THE TRAIL DILEMMAS!
YES, BUT WE FORGOT THE FOOD!

PACKING YOUR PACK

Name ______________________ Date ______________________

Directions: Four students are planning a hike to Cooper Canyon for a week. A mother will drive them to the trailhead. But, since the road dead-ends there, they will have to walk the 10 miles to the camp ground. Each of them will carry a pack. You are to decide what these four friends should take in their packs. Discuss this as a group and make a list of exactly what will go in Pack #1, Pack #2, Pack #3, and Pack #4. Remember that they will be hiking over steep mountains, dry sandy gullies, and a wooded area to reach the camp ground. They will be spending four days at the camp ground. The area to which they are hiking will be safe for swimming, exploring, and making a fire. Think very carefully about the things that the four students will need. If they forget to take something in their packs, they will have to be without it for the week. At the end of the lesson, you will ask some questions to see how good your choices were.

Because each of you should think of some ideas to add to the group discussion, take five minutes to make a list of some of your ideas. When the group discussion begins, raise your hand and share some of the items from your list.

Some items to bring:

PACK #1	PACK #2	PACK #3	PACK #4

Discussion: Here are some things that happened to the four students. Did your packs contain things to help them solve the problems that were involved?

1. One of the boys cut his leg, and it bled a lot.
2. It got dark before the students decided to return on the last day. They had to stay an extra day.
3. Caught in a rainstorm. Were they able to stay dry?
4. It suddenly became very cold. What was packed to keep them warm?
5. The friends went for a short hike and became lost. How did they find their way back?
6. It snowed the second day.
7. One student was bitten by a snake while hiking out to the trailhead.

TRAIL DILEMMAS

WE ARE STRANDED

Name ______________________________ Date ______________________________

Directions: Given an environmental card and several equipment cards, group will devise survival plans. Students are later asked whether or not they felt involved in their group.

Materials: Environmental cards and equipment cards.

1. Divide class into groups of six to eight students each.
2. Place the packs of equipment cards and environmental cards on table.
3. Instruct each group to send a member to the table. The person draws one environmental card and five equipment cards.
4. When persons return to their groups, signal all groups to begin a 10 minute period in which the members must devise a plan for survival for an individual stranded in an environment described on the card and with the equipment listed as available.
5. After 10 minutes, ask each group to describe its environment and equipment and to share the survival plan.

Discussion: Ask students:

1. Did you feel included in this activity?
2. What does it feel like when you are not included?
3. Is the group more effective when everyone feels included? Why or why not?
4. Do people who feel included like their group more than people who do not feel included?
5. Do you ever feel as though you are not included in other kinds of classroom groups? Why or why not?
6. What can be done this week to help more people feel included?

ENVIRONMENTAL CARDS

Hot, dry desert
Lifeboat on the ocean
Snowy mountain
Densely wooded forest
Swamp
Foreign country (with knowledge of language)
Dark cave
Jungle
Small deserted island

EQUIPMENT CARDS

Compass
Matches
Mirror
Telephone book
Radio
Machete
String
Box of crayons
6 coconuts
An innertube
Wrap
5 pounds of candy
Roll of tin foil
Newspapers
Magnifying glass
Wristwatch
Electrical tape
Base drum
Empty bottle
Hammer and nails
Canvas tarp
A chain 6 feet long

CONCEPTS

1. Individual/group tasks include:

   a. Proposing ideas (initiating individual/group tasks or goals, suggesting solutions to problems).

   b. Evaluating tasks (clarifying the task to be accomplished or problems to be solved, giving information needed by group members).

   c. Seeking ideas and information (asking questions, seeking opinions of others, seeking group agreement).

   d. Initiating action (carrying out a plan of action).

2. Social and emotional functions include:

   a. Encouraging others (being friendly, helping others to meet goals, and assisting with assigned tasks).

   b. Listening to others (discussing emotional and physical problems that may cause difficulty on the trail).

   c. Keeping things "cool" (finding solutions for disputes, resolving disagreements, reducing tension through using humor, encouraging others to resolve differences, expressing group feelings, and sharing one's own feelings with others.

BACKGROUND INFORMATION

If a group is to function effectively on the trail, it must solve individual and group tasks and deal with social and emotional problems that can affect the survival of the group.

Individual or group tasks are those functions which must be performed if the group is to accomplish its goals.

Social and emotional functions help the group maintain cohesion and encourage group members to develop positive feelings about one another.

Every trail group has its own leadership structure. The teacher usually has considerable authority by virtue of his/her position, but there is also an informal leadership structure because certain students have more natural leadership than do others.

Exercising leadership is not merely the giving of orders, it involves the fulfilling of certain group needs. Students leaders often fail to fulfill some of these group needs; and, as a result, the teacher

BACKGROUND INFORMATION (Cont'd.)

is often forced to take over the leadership.

The teacher's main task is to delegate the leadership among the students as much as possible. Reserach indicates that the quality of student performance on the trail and the quality of student interpersonal relations may be highest when the leadership is delegated among the members of the group.

Backpacking trips provide an excellent opportunity for students to assume leadership roles. Skills taught and practiced in the classroom can then be delegated to student leaders on the trail.

Individual Tasks:

1. Backpack and equipment
2. Personal hygiene
3. Physical fitness
4. Survival
5. Knowledge of natural environment
6. Keeping a log and journal

Group Tasks:

1. Care and cleaning of the campsite
2. Food preparation and menu planning
3. Camp sanitation
4. First aid
5. Trail safety
6. Using a map and compass

Social and Emotional Problems

1. Sharing a tent
2. Different cooking styles
3. The stress of hiking
4. Physical problems and accidents
5. Personality clashes
6. Fear of environment
7. Weather problems

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe two types of leadership skills:
   a. Problem solving techniques to accomplish tasks.
   b. Social-emotional leadership functions.
2. Prepare a chart depicting tasks and social-emotional needs that may require leadership assignments in the classroom and on the trail.
3. List types of leadership roles that can be assumed by the students in the classroom and on the trail.

"DOING ACTIVITIES"

Please refer to sample exercises on the following pages.

LEADERSHIP ASSIGNMENT CHART

Name ______________________________ Date ______________________________

Directions: Prepare a chart of leadership assignments and other tasks to be performed on the trail. Select a student for each assignment to be completed in the classroom and on the trail. It is the responsibility of each leader to see that a particular skill is taught and that the task is evaluated upon completion.

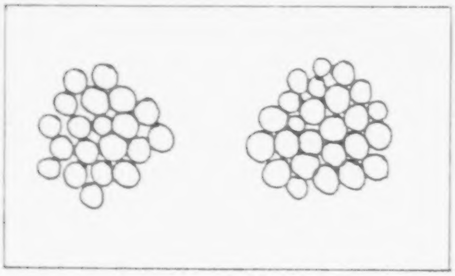
(This is a sample. Students should make their own chart.)

		Check One	
	LEADER	GOOD	NEEDS IMPROVEMENT
1. Use of equipment			
2. Group and personal hygiene Camp sanitation			
3. Group physical fitness for hiking stress			
4. Group a. Sharing a tent			
b. Cooking skills			
c. Food and menu preparation			
d. Weather problems			
5. Trail safety			
a. Accidents			
b. Physical problems			
6. Using a map and compass			
7. Knowledge of natural environment			
8. Quality of logs and journals			
9. Emotional problems			
a. Personality clashes			

OUR CLASSROOM GROUP

Name ______________________ Date ______________________

Directions: If you were to think about our class as a group, which one of these drawings would most nearly resemble our class? Pretend that each circle stands for a person in our class. Circles that are close together stand for people who are friends. Check the drawing that most resembles our class.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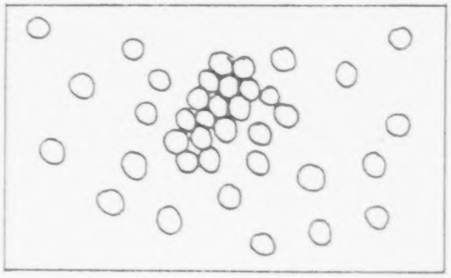
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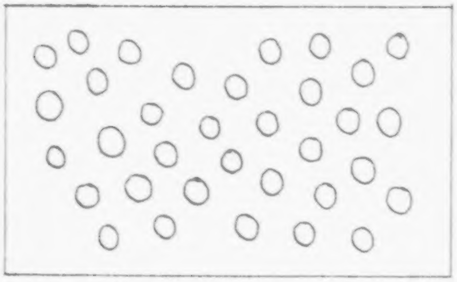
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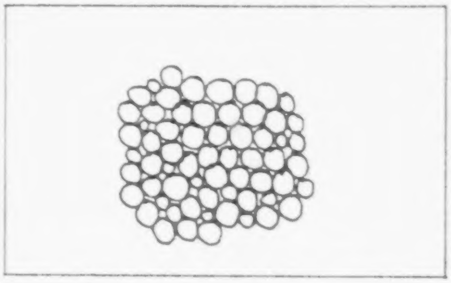
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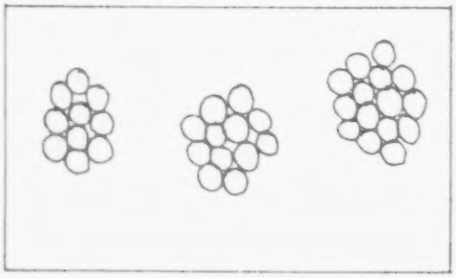
C.

F.

OTHER - PLEASE DRAW

HOW ARE YOU INFLUENCED?

Name ______________________ Date ______________________

Directions: Do you always do what other students ask you to do?

Do you always think about what other students think of you?

There are some people who are very important to you and who influence you. What are these people like? Here is a list of reasons that other people have given for being influenced by others.

Check the items below that influence you to respond to other people. Use 1-5 to identify the most important items. Use A-E to indicate the least important items.

_____ 1. This person: Is really smart in school and gets good grades.

_____ 2. Is a good fighter.

_____ 3. Is very friendly.

_____ 4. Has a lot of good ideas and knows how to express them.

_____ 5. Is one of your best friends and plays with you a lot.

_____ 6. Gets along with the teacher really well.

_____ 7. Doesn't start fights and doesn't bug other people.

_____ 8. Is really popular with the other kids.

_____ 9. Is a "foxy" looking kid.

_____ 10. Does you a lot of favors and even gives you things.

_____ 11. Is big and strong.

_____ 12. Can do a lot of things really well.

_____ 13. Is good at sports.

_____ 14. Never chops or cuts anyone down.

_____ 15. Has a lot of things and a lot of money.

_____ 16. Gets into a lot of trouble but is a funny person.

_____ 17. Will get a lot of kids after you if you don't do whatever they tell you to do.

_____ 18. Isn't afraid to do things differently from the way others do them.

COMPLIMENTS WITHOUT SLAMS

Name ______________________ Date ______________________

Directions: Students compliment each other while passing a ball of yarn to the class members they have complimented. The ball of yarn is slowly unraveled as it is passed from student to student.

Materials: A ball of yarn.

1. A group of 5-7 students forms a circle. The facilitator holds the end of a ball of yarn and throws the ball to a person and makes a positive statement in the second person. (For example: "Al, you are good at sports." "Thank you for helping me with my math, Mary." "I really like the way you try to help others in the class."). The person receiving the compliment takes up the slack, holds the string, and throws the ball of yarn to another student and compliments him/her.
2. After all students have received the yarn, they examine the pattern formed and are asked to note the ties that bind them together as a group.
3. The last student slowly rolls up the ball of yarn while others let go of the yarn as needed.

Discussion: Ask the students:

1. Do you think compliments among class members help tie the group together even when there is no string to do so?
2. Does this class need to be tied together more? Are there students or groups who are not tied together well?
3. Could we tie the group together by giving more compliments to each other?

A GROUP TASK: CREATING A GAME

Name ______________________ Date ______________________

Materials: Set of common objects, such as paper cups, a rope, a bucket, a piece of cloth, etc.

Directions: Given a set of objects, request that each team design a game that can be played with these objects.

1. Divide class into three to five teams.
2. Introduce the task to the groups.
    - a. Each team is shown the same set of objects.
    - b. Each team is to design a game that can be played using all of the objects.
3. At the end of the allotted time, ask one representative from each group to share its game with the class.
4. Ask groups to share their successes or problems during the activity.

Problems that group encountered:	Successes that group achieved:
a. ____________	a. ____________
b. ____________	b. ____________
c. ____________	c. ____________
d. ____________	d. ____________
e. ____________	e. ____________
f. ____________	f. ____________
g. ____________	g. ____________

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SOAPBOX TIME

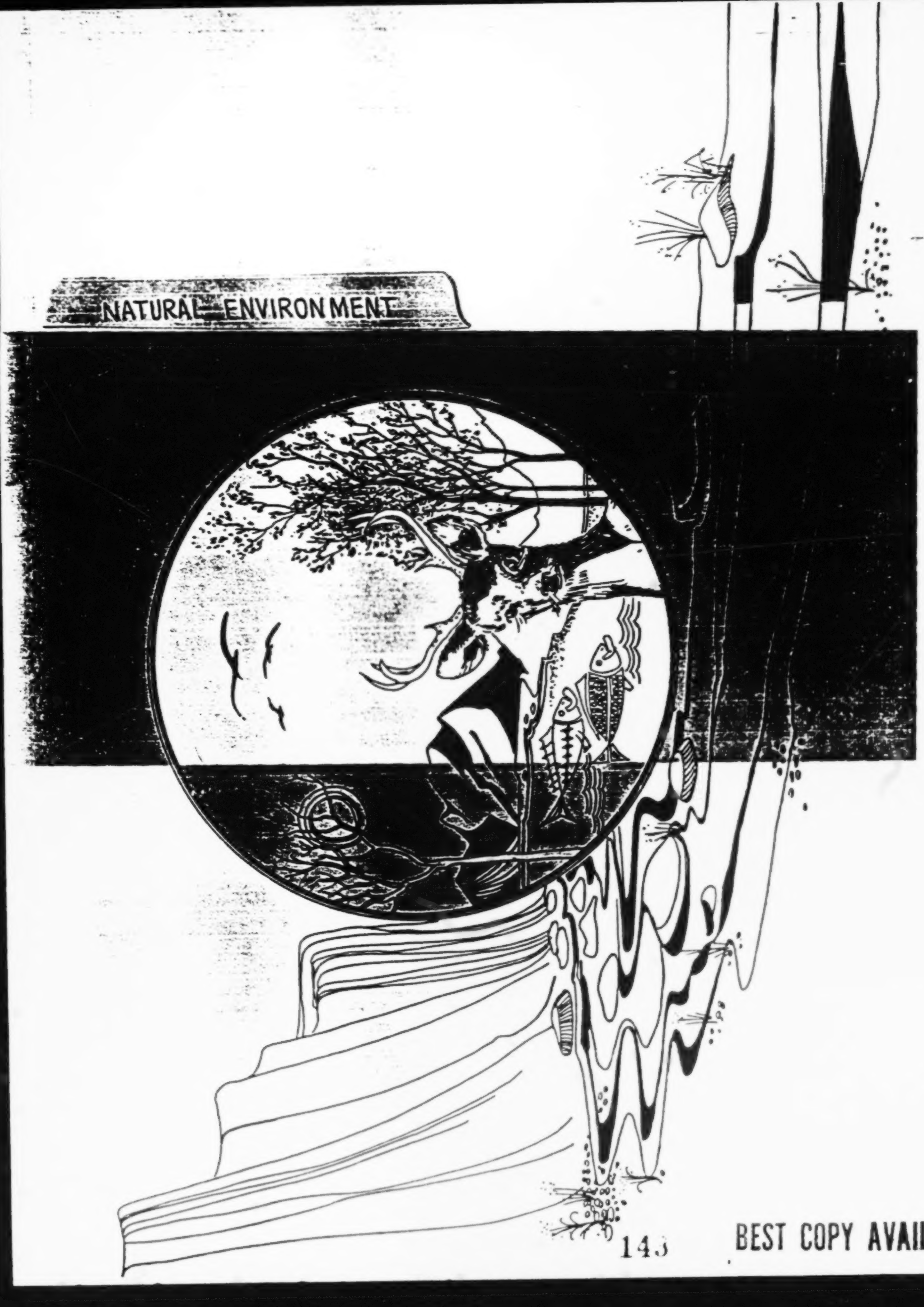
Name ______________________________ Date ______________________________

Materials: A place in class designated as a "Soapbox." This place may be a wooden box, a high stool, or a certain chair.

Directions:

1. Purpose of the Soapbox:
    a. Point out that students have a right to their own ideas and opinions. This is an opportunity to share them regularly with other persons without being interrupted.
    b. Emphasize that this procedure will help other students in the class to hear everyone's point of view.
    c. If you are really concerned about something, speak up and express your views.
    d. Explain that the results will be a useful gauge of classroom interests, concerns, and problems.
2. Rules for the Soapbox:
    a. Explain that the Soapbox is a place to give opinions and that it is for use of students and teachers as well as other adults in the school.
    b. At regularly scheduled times, perhaps once or twice per week, invite students and others to speak from the Soapbox for a 10 minute period or as needed.
    c. Allow each speaker 3-5 minutes.
    d. Limit topics to those related to the class.
    e. Emphasize that it is the responsibility of the audience to listen to whom ever is speaking from the Soapbox.
3. Encourage its use by speaking from the Soapbox yourself when you feel the need to "sound off" to the class.

NATURAL ENVIRONMENT



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CONCEPTS

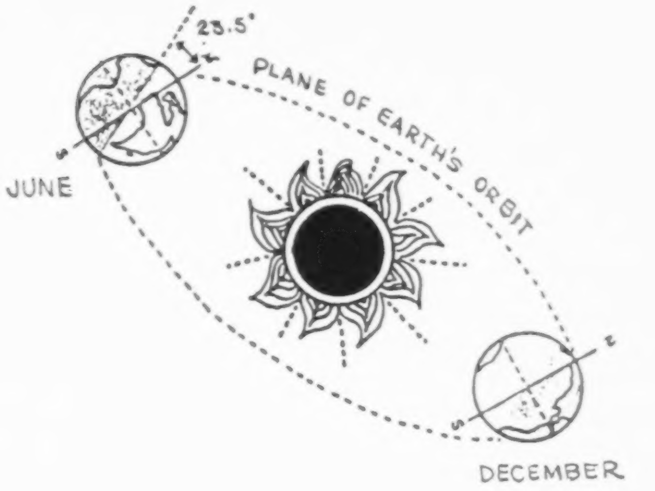
1. The Earth is the third planet from the sun in the solar system.
2. Our solar system includes all the bodies in space that orbit around the sun.
3. The rotation of the Earth is responsible for creating day and night.
4. The revolution of the Earth (its orbit around the sun) defines one year.
5. The axis of the Earth is not perpendicular with its orbit but is at an angle.
6. The tilt of the axis is responsible for the seasons of the year.
7. The Earth is located in a galaxy named the Milky Way (so named because of its appearance as viewed from the Earth).

BACKGROUND INFORMATION

The Earth belongs to the sun's family of celestial bodies known as the solar system. The Earth is the third of nine planets to orbit around the sun. Even unaided by the telescope, a person can see some of the other members of the system. The moon, meteors (seen as shooting stars), planets, and comets can be observed in the night sky.

The Earth not only revolves around the sun on its orbit but also rotates on its own axis. It takes the Earth 365¼ days for one revolution and 24 hours for one rotation. Revolution is the path that the Earth travels as it goes around the sun. Rotation is the Earth's turning on its axis.

The Earth's axis of rotation can be thought of as an imaginary line extending from the geographic North Pole to the South Pole. The axis of rotation is not perpendicular to the plane of the Earth's orbit around the sun. The axis in inclined 23.5 degrees from the perpendicular.



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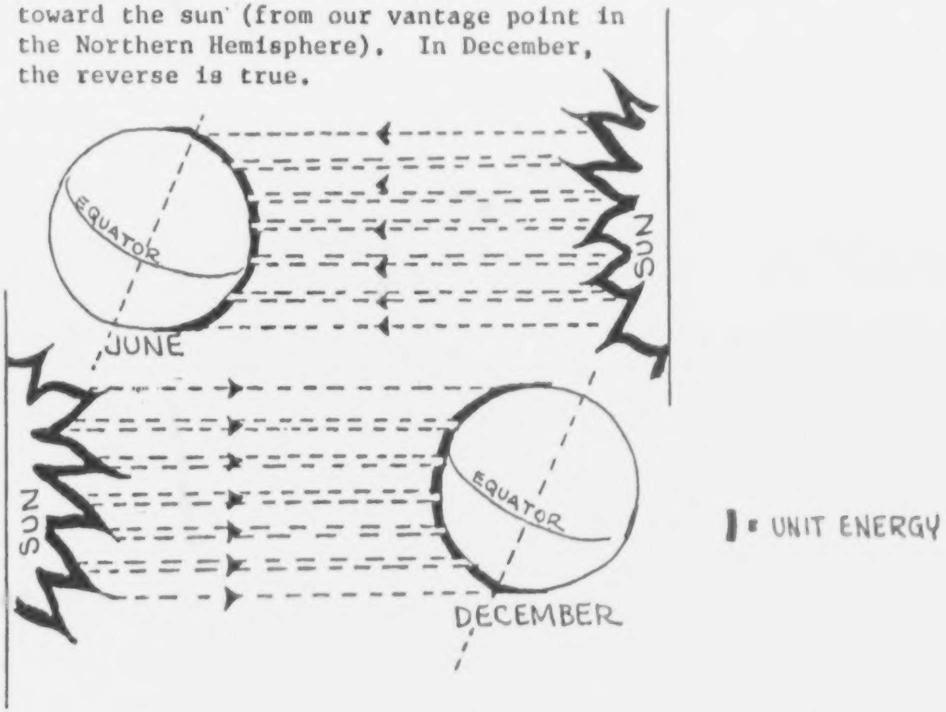
BACKGROUND INFORMATION (Cont'd.)

Because the Earth's axis of rotation is inclined, the Northern and Southern Hemispheres do not receive the same amount of the sun's energy at the same time. It is assumed that the sun's energy is constant, or nearly so, all year long. It is also assumed that the sun is so far away that its rays are parallel to one another by the time that they arrive at the Earth. In June, the Northern Hemisphere receives a greater concentration of sunlight per unit area than does the Southern Hemisphere. The axis of rotation is inclined toward the sun (from our vantage point in the Northern Hemisphere). In December, the reverse is true.



The Earth rotates on its axis from west to east once every 23 hours 56 minutes. This phenomenon accounts for day and night. This rotation makes the sun seem to rise in the east and set in the west.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate how the seasons change and what causes night and day.
2. Understand the positions of the Earth and the other planets in the solar system.
3. Explain the difference between the terms revolution and rotation.

"DOING ACTIVITIES"

Students will be able to:

1. Demonstrate how the length of day changes from season to season. Using a flashlight as the sun, students will take an orange and insert a small stick through it to represent the Earth on its axis. The students will place the orange to the left of the imaginery sun so the "North Pole" points to the "sun" at the proper angle. Now let the "Earth" revolve around the "sun."

"DOING ACTIVITIES" (Cont'd.)

Note that, half way through the Earth's rotation, the South Pole points to the sun, and the North Pole tilts away. This demonstration is most effective at night or in deep shade.

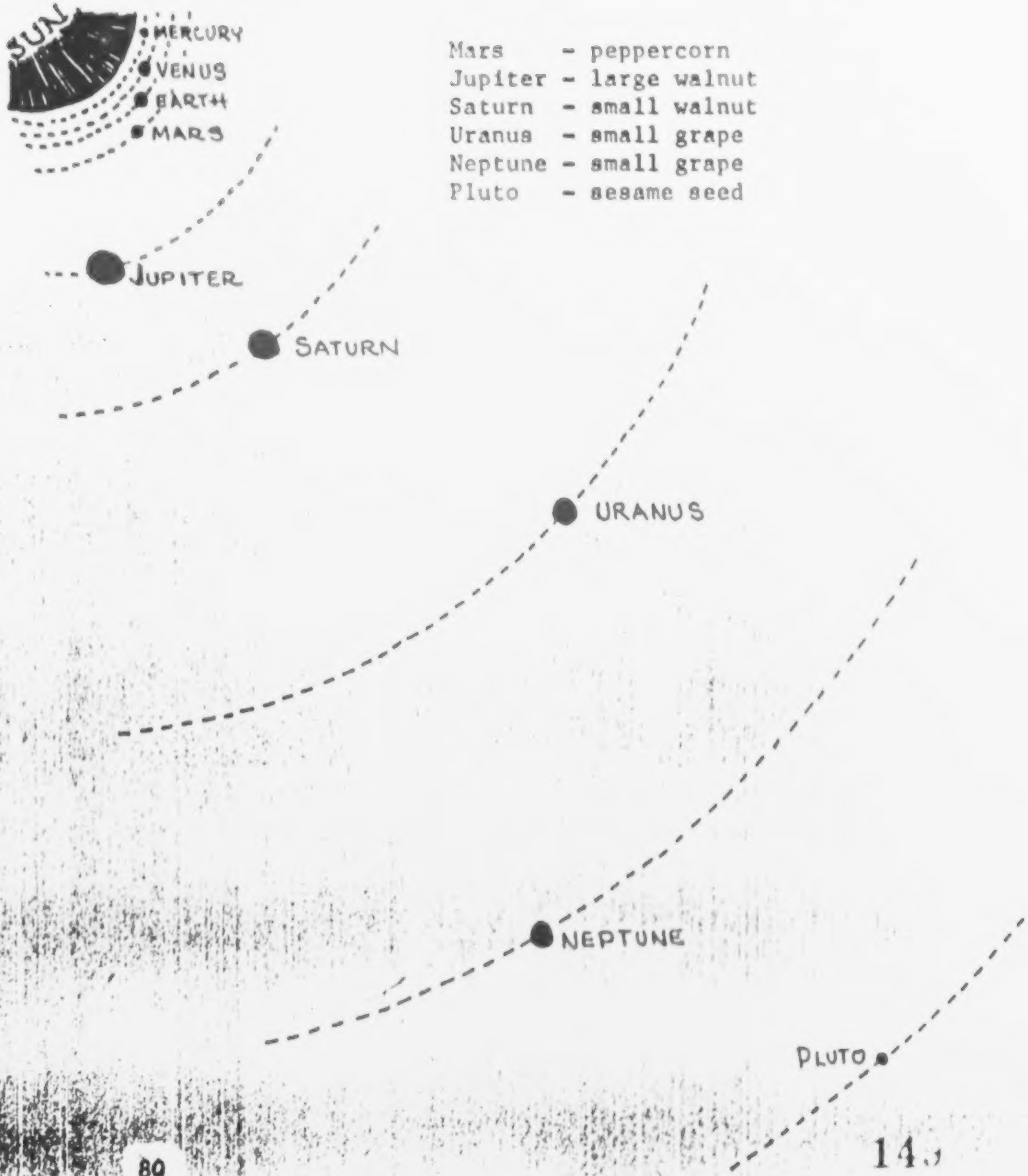
2. Demonstrate the distance that exists between the planets. Each of nine student volunteers will represent a planet and will pace off its distance from the sun, as follows:

Mercury	1	step
Venus	2	steps
Earth	3	steps
Mars	4½	steps
Jupiter	15½	steps
Saturn	28½	steps
Uranus	57½	steps
Neptune	90	steps
Pluto	118	steps

This exercise should be performed during the day on level ground.

3. Compare the relative sizes of the planets, using seeds and various fruits to represent them, as follows:

Mercury - sesame seed
Venus - pea
Earth - pea
Mars - peppercorn
Jupiter - large walnut
Saturn - small walnut
Uranus - small grape
Neptune - small grape
Pluto - sesame seed



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CONCEPTS

1. Constellations are star patterns in our galaxy as viewed from Earth.
2. Constellations appear to change location in the sky during the year as the Earth revolves around the sun.
3. Constellations appear to change location in the sky during the night as the Earth rotates on its axis.
4. Stars emit their own light radiation.
5. Planets reflect light from other sources of light.

BACKGROUND INFORMATION

Observers of the sky in ancient times grouped the stars together in patterns known as constellations. Most of the names come from stories in their mythologies. Probably the best known constellation is Ursa Major or the "Big Bear." The "Big Dipper" forms the tail and part of the back of the bear.

Constellations vary in the night sky from month to month due to the revolution of the Earth. What a person sees in the summer sky is not what he/she sees in winter. Even as the night progresses, constellations alter their positions. In an hour, they move about 15 degrees through the heavens.

In the summer sky, Lyra (the "Lyre" with its brilliant star Vega), the "Northern Cross," and "Scorpio" (the scorpion with the red supper giant star Antares) can be seen.

In the winter sky, one might observe "Orion," the mighty hunter (with red super giant star Betelgeuse) and "Pleiades," the seven sisters.

Stars that make up the constellations vary in brightness, distance, and color. Brightness is called apparent magnitude. Apparent brightness does not always correlate with the distance of the star from Earth. The real brightness is called luminosity. Luminosity deals only with size and heat, the total energy released by the star.

Stars differ in color. The hotter the star is, the bluer it is in color. The cooler the star is the more reddish in color it appears to be. This phenomenon can be observed when metal is heated. As the metal becomes hotter, its color changes from red to orange to yellow to white and, finally, to blue.

The emission spectrum, both visible and invisible to our eyes, conveys information on distance, speed, and direction of motion as well as a limited amount of information on composition. Stars are almost all made of the same basic materials, hydrogen and helium.

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BACKGROUND INFORMATION (Cont'd.)

When a person looks at the night sky, he/she can also see planets. At first, they look like stars, but there are two visible differences. First, planets wander through the constellations. Second, the planets appear to shine constantly while stars twinkle. This is a result of the apparent larger size of the visible planets.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify the following constellations:

   . Ursa Major
   . Ursa Minor
   . Cassiopea

   (These circumpolar constellations are usually visible all year long in the Northern Hamisphere.)

2. Identify one prominent constellation typical to the evening sky:

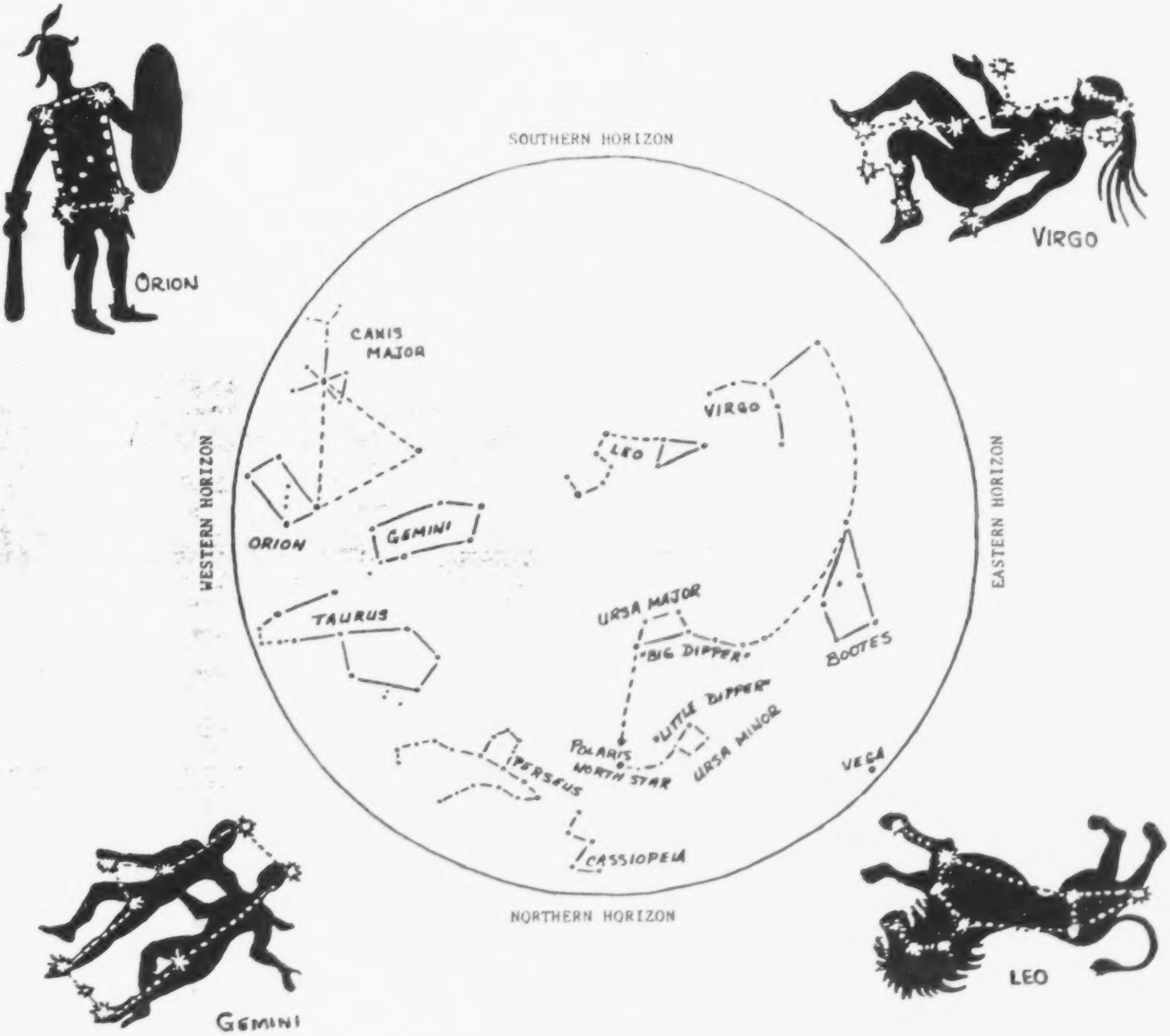
   Fall - Cygnus
   Winter - Orion
   Spring - Leo
   Summer - Scorpio

3. Distinguish between a planet and a star in the night sky.

"DOING ACTIVITIES"

Students will be able to:

1. Study a star map before looking for any constellation. These can be easily acquired from the Griffith Park Observatory or magazines, such as Science and Children. Star charts are provided month by month. Diagrams of the constellations can be drawn on stiff cardboard. Next dots, representing stars, can be recorded in fluorescent paint. These drawings can be used on the trail in identifying star patterns.
2. Identify at least one planet and describe how it is different from the surrounding stars.
3. Find and name one constellation. Observe that constellation over the next three hours and discuss what is happening to it. The constellation "moves" because of the rotation of the Earth on its axis.
4. Study the history of the naming of constellations as related to the Greek myths.
5. Construct a tin can planetarium. Punch out a constellation on the end of the tin can, using a nail and a hammer. Place a flashlight at the open end and flash the "constellation" on the ceiling of a darkened room.


ORION
VIRGO
SOUTHERN HORIZON
CANIS MAJOR
VIRGO
LEO
WESTERN HORIZON
ORION
GEMINI
EASTERN HORIZON
URSA MAJOR
TAURUS
BIG DIPPER
BOOTES
LITTLE DIPPER
URSA MINOR
POLARIS
NORTH STAR
VEGA
PERSEUS
CASSIOPEIA
NORTHERN HORIZON
GEMINI
LEO

Evening Skies in the Spring

This chart is drawn for 40° north latitude. It represents the sky at the following local times:

Late March	10:00 p.m.
Early April	9:00 p.m.
Late April	8:00 p.m.

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CONCEPTS

1. The gravitational force of the moon attracts all bodies of water here on Earth, causing the tides.
2. The gravitational force of the moon attracts air molecules, causing air tides.
3. The gravity of the moon lifts the Earth mass, causing Earth tides.
4. One side of the moon always faces the Earth.
5. The moon can be seen at night or during the day if it is in the proper position and clouds do not obscure it.

BACKGROUND INFORMATION

The moon is a satellite of the Earth. To compare it to the earth in size would be like comparing a baseball to a basketball. The surface is rocky and has many craters, most of which were created by meteorites. It has no atmosphere, water, or life. The moon greatly affects conditions on the Earth.

The moon has a differential gravitational pull on the Earth, causing Earth tides, air tides, and water tides.

The gravitational attraction of the moon can deform the Earth's crust. "Earth tides" of 0.2m are the equivalent of 3.3m oceanic tides since the continents are considerable less fluid. Because the diameter of the Earth is so great, a person is not aware of this rise of the tide.

The moon also pulls at the air molecules; but, again, the movement goes unnoticed. The air's molecules are so low in mass that the very small atmospheric tide is impossible for a person to sense without the aid of sensitive instruments.

The gravitational pull on the water is the most noticeable. Twice per day, the tides of the ocean are high, and twice per day they are low. Every 6 hours and 12 minutes the tides change. The tidal movement of water is the result of four forces. The strongest force is the Earth's own gravity. The second force is the rotational force of the Earth. The water does not fly out into space because the Earth's gravity is much greater than the rotational force. The third is the gravitational pull of the moon on the Earth's water. It is greatest on the side of the Earth facing the moon and least on the far side. The fourth is the gravitational foce of the sun. This force is similar to that of the moon; but, because of the sun's great distance from the Earth, the effect on tides is only about one half as great as that of the moon.

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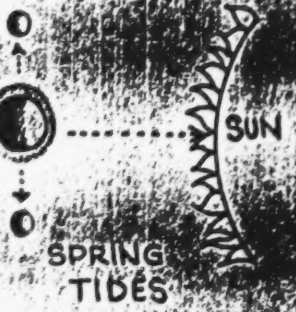
BACKGROUND INFORMATION (Cont'd.)

Most people can easily understand how the moon can cause the waters on Earth to be pulled into high tides. It is more difficult to understand why there is another high tide on the opposite side of the Earth. Two factors are involved, Earth gravity shift and Earth rotation.

The moon's mass, being relatively close, shifts the Earth's center of gravity in the moon's direction. Therefore, the moon's pull on the water mass on the opposite side of the Earth is slightly lessened. In addition, the rotation of the Earth tends to "throw" the water mass off the Earth. Normally, this tendency is counteracted by the Earth's gravity. At a point directly opposite the moon, however, the gravity shift referred to above allows the high tides to develop. Low tides develop at geographic points between high tides.

The pull of the sun modifies the effect of the tide producing forces of the moon. When the sun, moon, and Earth are lined up, tides are highest (spring). When the sun, moon, and Earth forms a right angle, the tides are lowest (neap tides). (See diagram.)



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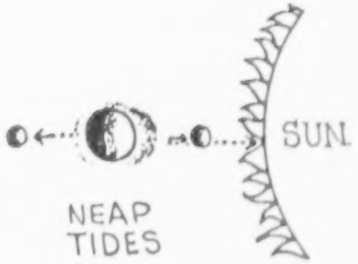


When a person looks at the moon, he/she always sees the "man-in-the-moon" side. The reason is that the moon's revolution and rotation take the same length of time, 27-1/3 days. The other side of the moon is never visible from Earth.

The moon is always involved in what is called solar and lunar eclipses. In a solar eclipse, the moon is between the sun and the Earth, casting a small shadow. In a lunar eclipse, the moon is in the shadow of the Earth, which prevents the rays of the sun from reaching the moon's surface.

The moon appears farther east in the sky at the same time each night because it is revolving in the same direction the Earth rotates. The moon revolves 1/27 of the way around the Earth each hour. In time, this occurs in 50 minutes. Since the moon rises 50 minutes later each day, it can be seen in the day as well as night.

CURRICULUM OBJECTIVES

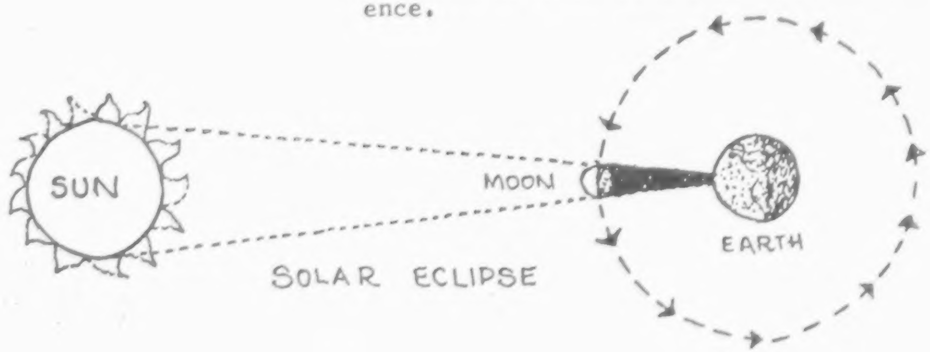
Students will be able to:

1. Explain why people see only one side of the moon.
2. Explain how the sun and moon relate to a solar eclipse and lunar eclipse.

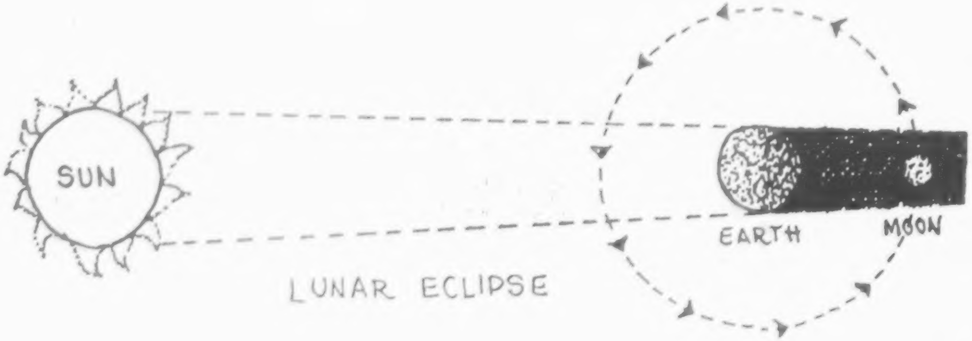
"DOING ACTIVITIES"

Students will be able to:

1. Demonstrate why people can see only one side of the moon. One student has a sign pinned on his/her back. The other students are to gather together in one group. The student with the sign tries to revolve around the members of the group without their seeing the sign. Then the student moves around the group without rotating. Is it possible to see the sign now? Relate this outcome to the movement of the moon and Earth.
2. Demonstrate what happens in a solar and lunar eclipse, using a flashlight or a projector image (if done in class) as the sun, an orange for the Earth, and a pingpong ball for the moon. Place the ball between the orange and the light source to "create" a solar eclipse. Now place the orange between the light source and the ball to illustrate a lunar eclipse.
3. Observe how the moon changes position in the sky each night. Find the moon in the sky at 8:30 p.m. for five consevative nights. Face directly south and draw the position of the moon on each night. Students should see a change in position and shape of the moon. Use some fixed object on the southern horizon as a point-of-reference.



SOLAR ECLIPSE



LUNAR ECLIPSE

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CONCEPTS

1. Without the sun, life as it is now known could not exist on Earth.
2. Sunspots affect humans and other life on Earth.
3. The sun is an important source of energy at home and on the trail.
4. Excessive solar radiation may have damaging effects on the human body.
5. White reflects and black absorbs solar radiation.

BACKGROUND INFORMATION

Without the sun, life as it is how known on Earth would be non-existent. The sun's warmth is necessary for activity of all living species. It is the energizing force behind the process of photosynthesis which provides food and oxygen for the Earth and its people.

The sun is really a star made mostly of hydrogen and helium (light gases). Although only a star of average size, its mass is 700 times greater than the mass of all the planets of our solar system put together.

The surface temperature of the sun is 5,500 degrees C. On the surface, great storms periodically occur. These storms are called sunspots. On occasion, solar flares erupt, sending forth a great amount of ultraviolet radiation and subatomic particles, which disrupt the ionosphere. This interferes with radio and television communication.

On the trail, the sun can be a friend as well as an enemy. Using the sun is simple. The placement of camp is one way of utilizing the sun. Establish camp so that in the morning it receives the sun's rays.

White reflects the sun's radiation, and black absorbs it. This characteristic can be used to trap the sun's energy in order to warm water and other objects. Using reflectors can also harness the sun's force for cooking.

In the city, the effects of the sun on the body are usually not noticeable. But, in the field, the sun can be very damaging. Over exposure can cause sunburn, heat exhaustion, sunstroke, and heat cramps. For some individuals, over exposure to ultraviolet rays through the years can also lead to skin cancer.

CURRICULUM OBJECTIVES

Students will be able to:

1. Discuss the relationship of the sun to the world's food and oxygen supply.
2. List the damaging effects that excessive solar radiation can have on the body.
3. Use the sun's energy beneficially.

"DOING ACTIVITIES"

Students will be able to:

1. Demonstrate how the sun is the energy force in the process of photosynthesis. Take two test tubes and fill each with a sprig of elodea, water, and bromthymol blue (indicator of carbon dioxide). Exhale through a straw, blowing bubbles in both test tubes. The color in the test tubes should be orange. Place stoppers in both test tubes. Set one tube in the sunlight and the other in the dark. The content of the tube in the light should turn blue while that of the tube placed in the dark should remain orange. Discuss the meaning of this exercise.
2. Demonstrate that heat is absorbed by black. In camp, fill a black polyethylene bag and a white polyethylene bag with the same amount of water. Now hang them next to one another from an unshaded limb. After a couple of hours, check whether there is a temperature difference between the two bags. The water in the black bag should be warmer, illustrating that black absorbs heat.
3. Demonstrate that heat is absorbed by black and reflected by silver. Take an empty can (metal if possible) and paint one half black and the other half silver. Silver foil can be substituted for the silver paint. Take a cork and split it half-way through and then insert a theremometer through the middle. Now cork the can. First, face the silver half of the can to the sun and record the temperature. Now face the black surface toward the sun and record the temperature. Is there any difference? Relate these findings to camp clothing, spacecraft, and space suits.
4. Build a solar oven.

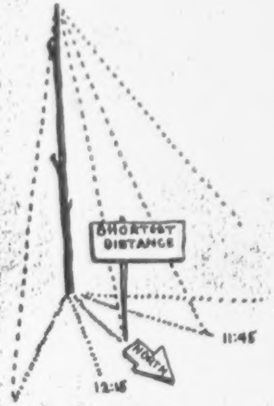
CONCEPTS

1. The pointer stars in the Big Dipper point to Polaris, the North Star.
2. The sun, at local noon, casts shadows which are shortest because the sun is at its highest point in the sky. In the Northern Hemisphere, this noon shadow points to true North.
3. Latitude is the distance north or south of the Equator as expressed in degrees.
4. The elevation of the North Star (Polaris) is used to determine latitudinal position on the Earth's surface in the Northern Hemisphere.
5. Longitude is the distance east or west of the prime meridian.

BACKGROUND INFORMATION

Since time began, humans have always looked to the heavens. Primitive people considered the sun as the source of all life. The Egyptians believed Atum-Ra was the ruler of creation. The ancient Greeks and Romans believed that gods ruled the stars and planets.

Superstition and fear guided the lives of early people. Little by little, these fantasies gave way to knowledge as new discoveries have opened up the heavens to greater understanding.



Ancient sailors looked to the heavens to guide their ships. Much of what they discovered is still used to find true North and South. One way to find true North is by finding the Big Dipper, using the pointer stars (two stars opposite the handle). Space out that distance five times, and it should point to the North Star. During the mid-1800's, slaves escaping to the North were told to follow the "drinking gourd" (the Big Dipper).

Because the Earth gyrates as it rotates on its axis (much like the action of a top), the North Star is continually changing position. The ancient Egyptians used Thuban as a North Star. In another 4,000 years, the North Star will be Vega.

During daylight hours, true North can be determined by measuring the shadow cast by the sun at high noon. If shadows are measured from before noon until after noon, the shortest shadow will be at midday. This midday shadow points to true North.

To describe a position on the surface of the Earth, a system of interacting lines called latitude and longitude has been devised. The reference line for latitude is the equator. Latitude lines indicate dis-

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BACKGROUND INFORMATION (Cont'd.)

tance north or south of the equator. The parallels are numbered from 0 at the equator to 90 degrees north at the North Pole and 90 degrees south at the South Pole. The latitude of any place can be found by measuring the angle formed by the North Star, the observer, and the horizon directly below the North Star.

The reference line for longitude is the prime meridian. The lines of longitude are parallel to each other near the equator, but converge as they approach the poles. The meridians are numbered in degrees east or west from the 0 meridian at Greenwich, England, to 180 degrees in the Pacific Ocean.

CURRICULUM OBJECTIVES

Students will be able to:

1. Find the North Star (Polaris), using the pointer stars in the Big Dipper.
2. Find the direction North by midday shadow.
3. Explain the difference between longitude and latitude.
4. Use the elevation of the North Star (Polaris) to determine the latitude.

"DOING ACTIVITIES"

Students will be able to:

1. Using a wrist watch set to Standard Time, point the hour hand of a watch directly at the sun. The point half way between the hour hand and 12 o'clock is pointing South. Directly opposite is North.
2. Measure with fists how high an object is in the sky. From the horizon to the highest point in the sky is one-quarter circle or 90 degrees. If students measure with their fists, putting one fist on top of the other, approximately nine fists will equal this angle. (One fist is roughly the same as 10 degrees.) This allows students to locate an object within a relatively small section of the sky.
3. Using a star map, find the Big Dipper. Using the pointer stars, space off five times the distance of these two stars in a straight line to Polaris (North Star).
4. Trace the form of a protractor on a 3" x 5" office file card. Now mark the angles on the card, making the 90-degree angle 0 degrees. Mark the angles in by tens. Now mark the very center of the base line of the protractor. From that center point,

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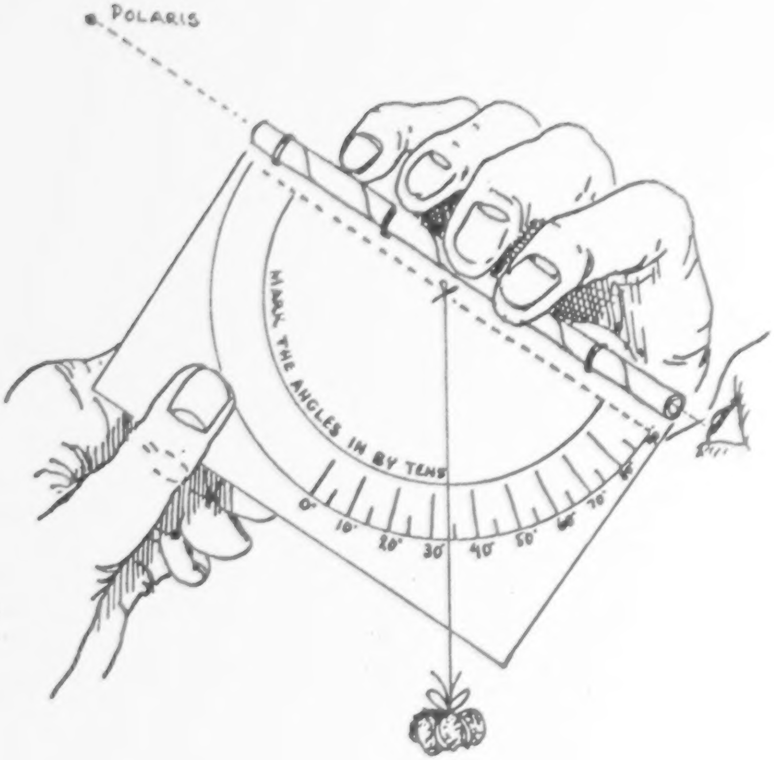
"DOING ACTIVITIES" (Cont'd.)

hang a weighted line. On the trail, use a stone for this weight. (These cards can be put in envelopes and carried in the packs). Attach a straw cut to the length of the card to the base line of the protractor. Now students are ready to measure the elevation of a skypoint. Point the straw at Polaris; then, read the angle where the plumb line fell. This angle should coincide with the latitude.

5. Stick a twig into the ground and, at intervals, mark with rocks the shadows cast by the stick. The shortest of all the shadows is the midday shadow. It points to true North.



CONCEPTS

1. The San Gabriel Mountains are part of California's Transverse Ranges, which lie counter to the state's north-south structural system.

2. The San Gabriel Mountains are composed chiefly of igneous and metamorphic rocks.

3. Different environments of geological formation produce rocks with different textures.

BACKGROUND INFORMATION

Most of North America is dominated by geologic structures that trend north-south. Most of the structures in California trend north-south as well. Major exceptions to this tendency are the Transverse Ranges, which were formed on an east-west mountain unit. This oddly aligned group of mountains extends about 300 miles (500 km) from Point Conception on the west to Joshua Tree National Monument on the east. These mountains include the highest peaks in California south of the central Sierra Nevada and contain some of the oldest rocks in North America.

The Transverse Ranges are divided into individual mountain ranges separated from one another by deep valleys. The San Gabriel Mountains are part of the Transverse Ranges and lie between the Los Angeles Basin and the Mojave Desert. The San Gabriel Mountains are a high, rugged block; it is some 60 miles (96 km) in length and up to 24 miles (39 km) wide. These mountains are bounded on the south by the Sierra Madre fault zone. The San Andreas fault zone is the eastern boundary and separates the San Gabriel from the San Bernardino Mountains. On the west the San Gabriel Mountains are bounded by the San Fernando Valley.

BRING IN SAMPLES OF VARIOUS TYPES OF ROCKS!

BACKGROUND INFORMATION (Cont'd.)

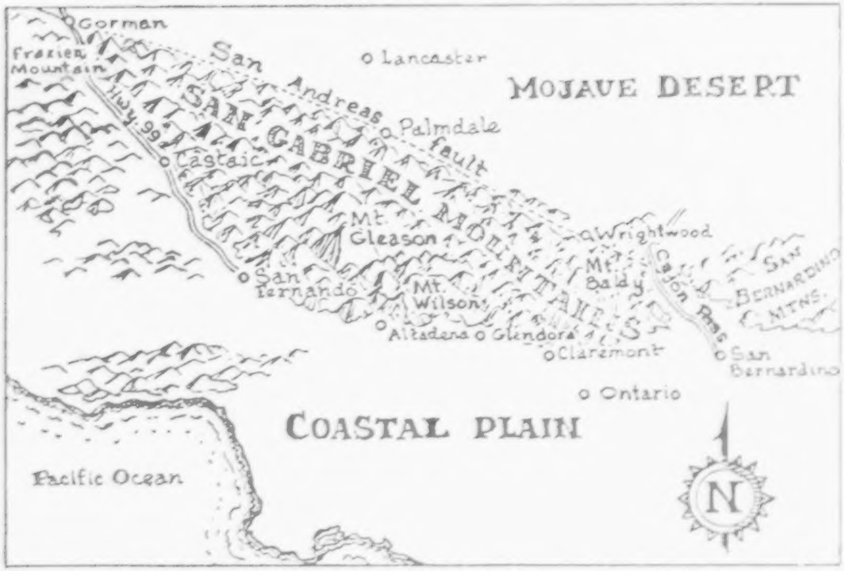

Gorman
Frazier Mountain
San Andreas fault
Lancaster
MOJAVE DESERT
Hwy. 99
SAN GABRIEL MOUNTAINS
Palmdale
Castaic
Mt. Gleason
Wrightwood
Mt. Baldy
Cajon Pass
SAN BERNARDINO MTNS.
San Fernando
Mt. Wilson
Altadena
Glendora
Claremont
San Bernardino
Ontario
COASTAL PLAIN
Pacific Ocean
N

Figure 1. Geography of the San Gabriel Mountains. Reproduced with the permission of the Los Angeles County Department of Parks and Recreation from Guide to the Natural History of Eaton Canyon Park.

Rocks of the San Gabriel Mountains

The San Gabriel Mountains contain the only Precambrian rocks in the costal mountains of the western United States. These rocks have been radiometrically dated at least 1.2 to 1.4 billion years old. They are not as old as the ancient rocks found in the Lake Superior region, but the gneisses of the San Gabriels are still considered early Precambrian.

About 70 percent of the exposed rocks in the San Gabriels are granite rocks. Radiometric dates for these rocks are approximately 70 to 84 million years. The Mount Lowe granitic rocks are about 220 million years old. This wide difference in ages suggests that the granitic rocks were produced in at least two different geologic episodes.

The two main types of rock in the San Gabriel Mountains are igneous and metamorphic. The predominate igneous rocks are:

1. Wilson quartz diorite. Has granite-like texture; whitish with small black crystals.

2. Lowe granodiorite. Is intermediate in texture between granite and gabbro; sometimes has large pink (to gray) and black crystals surrounded by smaller white crystals.

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BACKGROUND INFORMATION (Cont'd.)

3. Hornblende gabbro. Has granitic texture; dark gray with whitish crystals deeply enmeshed.

4. Granite pegmatite. Is pinkish with white crystals scattered throughout; large angular crystals.

5. Anorthosite. Is pure white to light gray; very course crystals; this rock is 1.2 billion years old.

The predominate metamorphic rocks are:

1. Mica schist. Has fine grains of mica running parallel with the property of breaking in thin, wavy, uneven layers. Muscovite mica shist is silvery, with small crystals of garnet throughout. Biotite mica shcist is dark and lustrous.

2. Gneiss. Is coarse, textured rock with minerals aligned in parallel light and dark bands.

Formation of Rocks in the San Gabriel Mountains

The igneous rocks of the San Gabriels were formed from molten rock (called magma) deep beneath the Earth's surface. Due to insulation by the overlying rocks, the magma was prevented from cooling rapidly. Slow cooling allowed the growth of relatively large individual crystals, clearly visible to the naked eye. The igneous rocks are mainly composed of crystals of four different minerals: quartz, feldspar, mica, and hornblende.

Gneiss and schist are rocks formed when older igneous or sedimentary rocks are subjected to heat and pressure intense enough partially to remelt crystals and squeeze them in to bands of light or dark against a contrasting background.

CURRICULUM OBJECTIVES

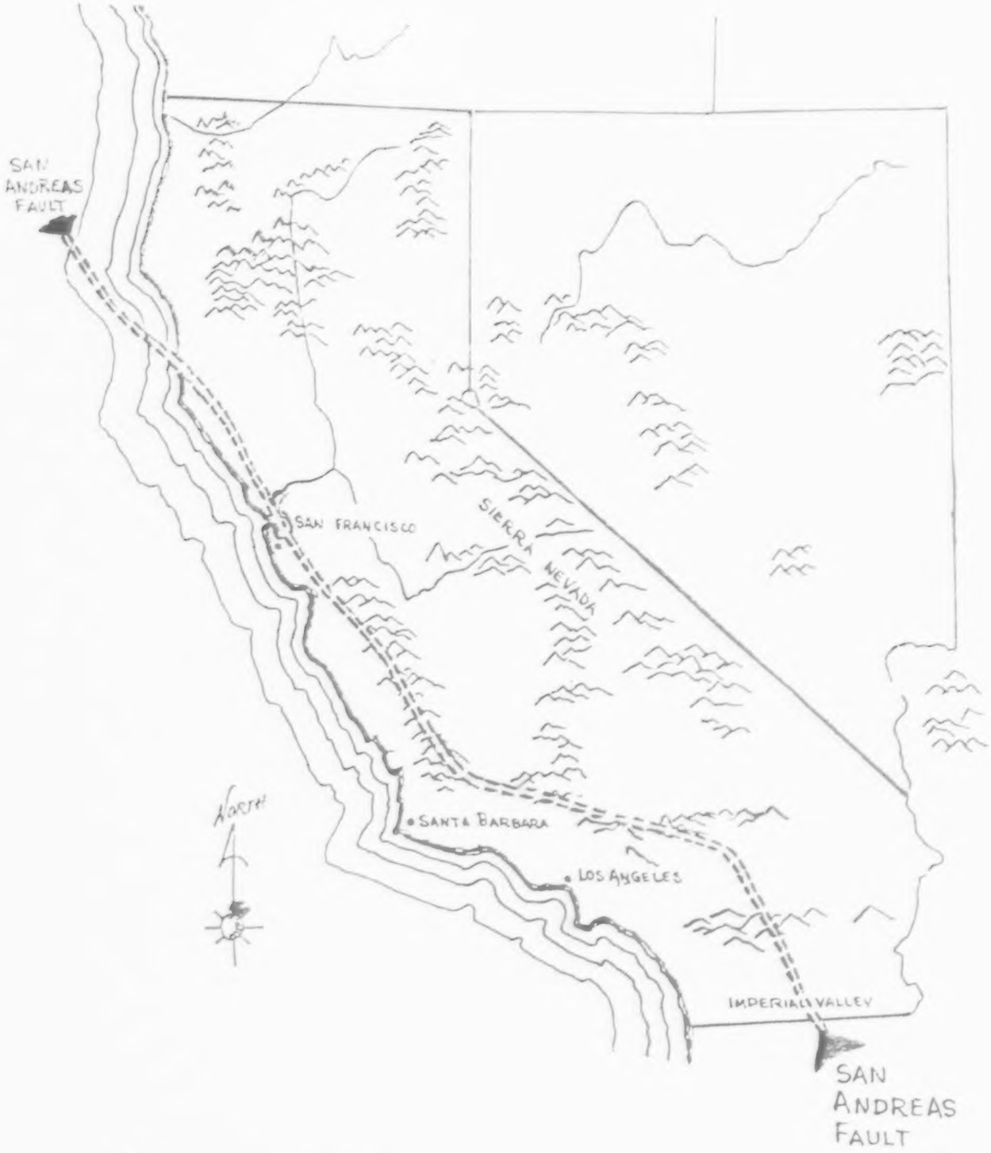
Students will be able to:

1. Describe the unique geographic setting of the San Gabriel Mountains as part of the so-called Transverse Ranges.
2. Describe the major types of rock which make up the San Gabriel Mountains.
3. Describe how granitic and metamorphic rocks were formed.

"DOING ACTIVITIES"

Students will be able to:

1. On an outline map of California, indicate the San Gabriel Mountains in relation to the Sierra Nevadas, Coast Ranges, and the San Andreas Fault.
2. While on a hike, point out and identify the types of rock which are common in the San Gabriel Mountains.
3. Describe the simple differences in the major types of rocks (i.e., igneous granites, schists, and gneisses).


SAN ANDREAS FAULT
SAN FRANCISCO
SIERRA NEVADA
NORTH
SANTA BARBARA
LOS ANGELES
IMPERIAL VALLEY
SAN ANDREAS FAULT

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CONCEPTS

1. The San Gabriel Mountains are uplifted above the surrounding landscape through repeated block faulting.
2. Running water has sculptured the San Gabriel Mountains to their present topography.
3. Movement of soil down the slopes of canyons occurs under the influence of gravity and creep.
4. Exposure of the rocks at the surface of the Earth contributes to their breakdown through physical and chemical weathering.

BACKGROUND INFORMATION

Although composed of very old rocks, the uplift of the San Gabriel Mountains is geologically young. Features which indicate this fact are steep slopes, narrow and deep valleys, and sharp ridges. The entire San Gabriel Mountain range has been uplifted from its surroundings by a process called block faulting which is associated with earthquake movements. These mountains have been uplifted in a series of separate blocks. Later erosion has carved valleys and canyons into the surface of the blocks, producing the present topography.

The recent uplift of the mountains has been rapid and strong. The increase in height has caused streams to flow very swiftly. Such streams erode their beds rapidly since fast-moving water can carry away a large amount of soil and rock. Erosion by running water takes place primarily at the bottom and sides of the streams, causing them to cut downward rapidly. Streams in the San Gabriels have produced deep, narrow, steep-sides, V-shaped canyons.

Repeated faulting shatters the rocks, making them more susceptible to erosion. With each rainy season, large quantities of rock and sand are washed down to lowlands and basins. The water-transported rock and sand are dumped at the mouth of canyons along the front of the range, forming conical, fan-shaped deposits called alluvial fans. Many alluvial fans have merged to form a broad apron of alluvial material that extends along the entire southern border of the San Gabriel Mountains. The foothill communities, such as Pasadena, are built on these alluvial fans.

The slopes of the canyons are continuously subjected to the downward movement of soil. Some soil is washed down the slopes after heavy rains. Even during times of no rain, the surface soil is slowly pushed down the slope, being moved by a combination of expansion and gravity. This gradual but continuous downslope movement is called creep.

BACKGROUND INFORMATION (Cont'd.)

When it is hot, the soil expands; when it is cold, the soil contracts. Soil cannot expand or contract upslope because of the weight of the soil mass above. Thus, the soil mass is free only to move downslope. A similar process occurs when soil expands as it becomes wet or shrinks as it dries.

Evidence of this continual creep can be seen in the way some trees grow. Their trunks curved out from the hillside as the trees were gradually bent over as the soil moved downslope. The tops of the trees bend in the opposite direction so they can keep growing upward toward the sun and sky.

Granite and gneiss were formed deep in the Earth and have been exposed after being uplifted, allowing all the overlying rocks to be stripped away by erosion. The rocks at the surface are exposed to chemical and physical weathering. Some of the surface rock today is quite deeply weathered. (It falls apart easily.) The rocks are often stained with rust, which is produced by weathering of the iron-bearing materials in the rocks.

The strong influence of faulting is also shown in the streams which occupy the deep and narrow gorges. The San Gabriel fault cuts through the center of the range. The course of the east and west forks of the San Gabriel River follows this fault for nearly 25 miles (40 km).

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe the influence which faulting has had on the present topography of the San Gabriel Mountains and which classifies them as young mountains.
2. Explain how the force of running water has altered the San Gabriel Mountains into their present shape.
3. Describe the process of creep, which contributes to the downslope movement of soil.

"DOING ACTIVITIES"

Students will be able to:

1. In the field, point out features that characterize the San Gabriel Mountains as geologically young.
2. Simulate on a stream table the formation of young canyons or stream valleys.
3. Simulate on a stream table the formation of alluvial fans. (Many foothill areas provide excellent examples of alluvial forms.)
4. In a group discussion, describe the influence of faulting on the San Gabriel Mountains.

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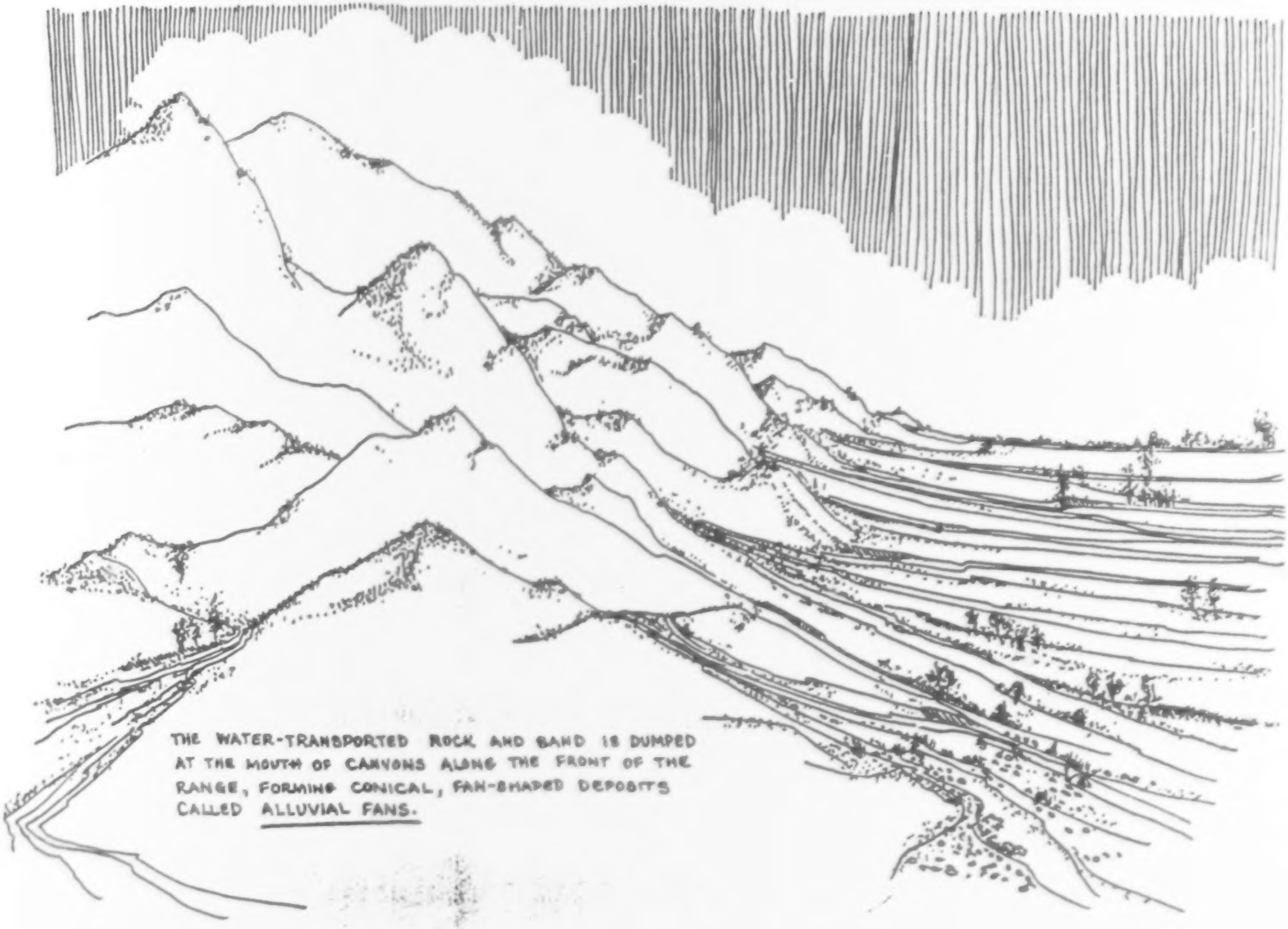

THE WATER-TRANSPORTED ROCK AND SAND IS DUMPED AT THE MOUTH OF CANYONS ALONG THE FRONT OF THE RANGE, FORMING CONICAL, FAN-SHAPED DEPOSITS CALLED ALLUVIAL FANS.

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CONCEPTS

1. The plate tectonics theory holds that the Earth's crust is dynamic and is made of seven or eight major plates.

2. Crustal plates interacting at their boundaries produce different geological phenomena, including earthquakes, volcanos, and mountain ranges.

3. The San Andreas Fault is the boundary between the Pacific and NOrth American Plates.

4. Geological and geophysical evidence supports the notion that the San Andreas Fault is a "transform boundary."

BACKGROUND INFORMATION

Elements of the Plate Tectonic Theory

The idea of continental drift (that land masses have moved across the Earth's surface) has been discussed by geologists for a number of years. However, it was not taken seriously by most geoscientists until the late 1950's. At that time, vastly increased data on sea-floor topography and magnetic properties of sea-floor rocks led scientists to re-examine the possibility of some type of continental-drift process to account for the present distribution of the continents. In the early 1960's, it was proposed that the Earth might be splitting apart at mid-ocean ridges, as new materials from the mantle rose along these ridges to produce new crust, a process called sea-floor spreading. Subsequently, it was recognized that magnetic patterns found paralleling the mid-ocean ridges confirmed this idea.

By the late 1960's most geologists were convinced that sea-floor spreading indeed accounted for much of the observed geological data found in the ocean basins and on the continents. The crust is now thought to be segmented into seven or eight major plates, some of which include entire continents. These plates, 25-160 miles (40-250 km) in thickness, are dragged along by the plastic flow of rocks deeper in the Earth's mantle. They are continually moving with respect to each other and producing a variety of phenomena, such as volcanism, earthquake activity, and mountain building.

The movement of these and other plates in the past has produced the present distribution of continents and ocean basins and has helped to explain many phenomena that geologists have long puzzled over.

Types of Plate Boundaries

Three crustal plate boundaries are recognized to exist. The types are convergent

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BACKGROUND INFORMATION (Cont'd.)

boundaries (plates moving toward one another); divergent boundaries (plates moving away from one another); and transform boundaries (plates slipping past one another).

The transform boundary is the most important to California. Located between two great crustal plates, it is the San Andreas Fault system. The San Gabriel Mountains stand on the edge of the Great Pacific Plate where it meets the North American Plate.

Seismologists are able to confirm lateral movement on faults within the San Andreas Fault system by reading seismographs (records of earthquakes) at several seismometer stations to determine the direction of intitial ground motion. Shallow earthquakes and lateral movement imply that the fault system is the boundary between two bypassing plates.

The northern San Andreas Fault is separated from its southern segment by the Transverse Ranges, the only east-west trending mountains in California. Some geologists have suggested that, during the initial formation of the San Andreas Fault (a northwest-trending structure), the deep-rooted Transverse Range mass and the Sierra Nevadas deflected the San Andreas Fault to the west, causing the pronounced bend in the fault. Once the fault bypassed this barrier, it returned to its northwest trend. Other geologists believe that the bend in the San Andreas Fault is largely the result of deformation after its original formation and not a result of "deflection."

Scientists are just beginning to understand the San Andreas Fault System. Current field investigations along the fault will, no doubt, resolve some of the inconsistencies in a model proposed for the origin of the San Andreas Fault. From this research may come answers to questions regarding the origin of the fault and the prediction of earthquakes.

During visits to the San Gabriels, hikers will find several areas where faults can be easily detected. The rocks are usually highly fractured, and "rift" valleys and sharp cuts in the mountain mass can often be observed. Some such locations are:

1. East and west forks of the San Gabriel River.
2. The straight base of the steep mountain front north of Eaton Canyon Park.
3. George's Gap, which overlooks the long valley from Red Box to Big Tujunga Canyon.
4. The long, straight valley between Big Pines and Wrightwood.

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BACKGROUND INFORMATION (Cont'd.)

It is important to remember that such obvious features do not in themselves prove the presence of a fault but that they indicate the geology might be fault controlled.

CURRICULUM OBJECTIVES

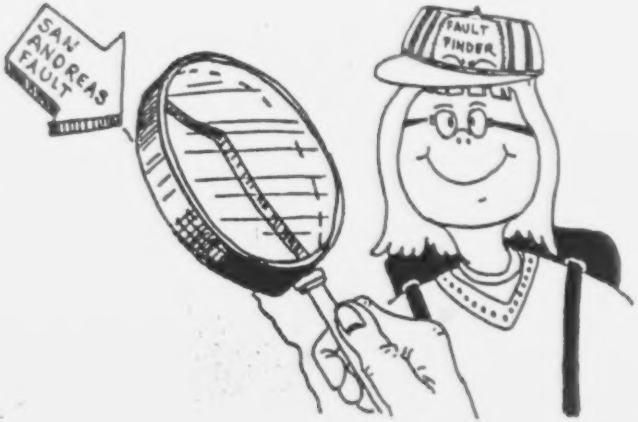
Students will be able to:

1. Describe the elements of the plate tectonic theory.
2. Describe the types of plate boundaries and geological phenomena associated with moving plates.
3. Discuss the evidence that the San Andreas Fault System is a plate boundary.

"DOING ACTIVITIES"

Students will be able to:

1. On an outline map of the world, sketch the plate boundaries that outline the seven or eight major crustal plates.
2. Discuss the relationship between the San Andreas Fault, and Pacific Plate, and the North American Plate.
3. Propose a possible explanation (hypothesis) of the pronounced east-west trending bend of the San Andreas Fault.
4. Cut out the continents and subcontinents from a world map and put them together to form the hypothetical Pangaea.
5. Become "fault-finders" by identifying areas they pass through where rocks have been highly fractured. Consult a fault map before the hike to be sure of the locations of faults.



CONCEPTS

1. All natural areas contain resources of value to humankind.

2. Natural resources can be those of economic value or those of value to the human spirit.

3. Certain resources, including air, water, land, trees and animals, are essential to the survival human beings.

4. Resources are classified as renewable or nonrenewable, depending on the time frame required to replenish them.

5. Because of the fragile nature of the mountain environment and the pressure of large numbers of people on the land, some resources should be left untouched.

6. Depletion of resources can be slowed by using wise conservation practices.

BACKGROUND INFORMATION

Every ecosystem contains natural resources which are of value. Usually, natural resources are thought of as being things that people need. These needs can either be economic or spiritual. Trees are needed by people to supply lumber; trees are also needed to provide shade and to give aesthetic pleasure.

Certain materials found in our environment are termed "renewable resources" since they are constantly being produced within the environment. Some resources in this category are game animals, lumber-producing trees, grazing land vegetation, and clean air and water.

As both renewable and nonrenewable, resources have been rapidly depleted, it has become imperative to set aside and preserve areas from change and exploitation. Wilderness sanctuaries and national forests are special areas that maintain an ecosystem as it has always existed.

In addition to leaving areas untouched by the "improvements" of civilization, people can extend the supply of resources by wise management. Reseeding areas after large-scale lumbering assures that the land will not be spoiled by erosion and that the forest will grow back. On a daily basis, people can conserve minerals and fossil fuels by using recycling centers and by expending minimal amounts of fuel for heating and cooking.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify five resources that are essential to humankind's survival.

2. Differentiate between mountain natural resources of economic value and

CURRICULUM OBJECTIVES (Cont'd.)

those of psychological or aesthetic value.

3. Distinguish between renewable and nonrenewable resources and give two examples of each.

4. Cite an example of a resource that is being misused and suggest a way for conserving it.

"DOING ACTIVITIES"

1. Study the basic resources that are essential to humankind's survival. On a hike, collect materials for a collage illustrating the basic necessities of life.

2. In preparation for a trip to the Angeles Forest, study the economic resources of the area to be visited and present a list of them to the group.

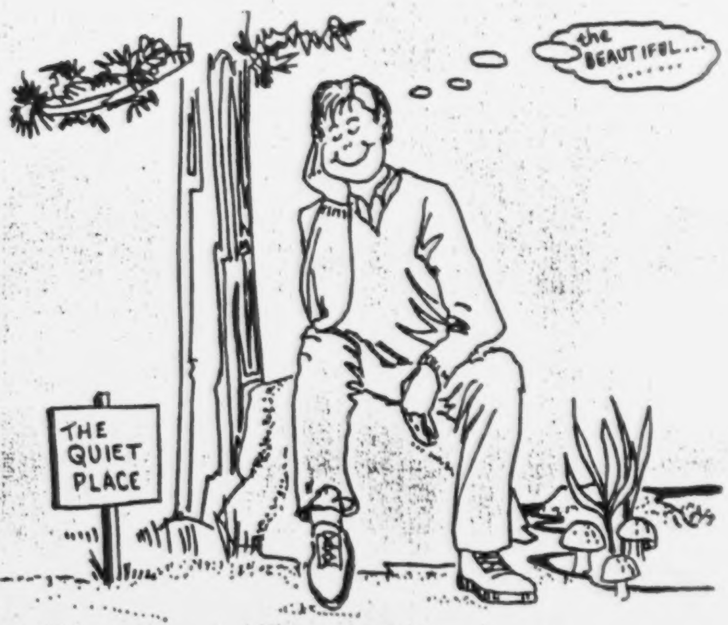
3. In preparation for the trip, study the historic economic exploitation of the area. If such activities have been stopped, study the reasons for their cessation.

4. On a hike in the Angeles Forest, observe the ways in which the forest is being used for the benefit of humans. Afterward, write an essay or make an oral report about these observations, particularly noting if any of the benefits to humans harm the forest.

5. Meet with a forest ranger to discuss how areas like the Angeles Forest are protected.

6. Find a quiet place where you can be alone, and mentally list the things you hear, see, smell, or feel that are most enjoyable to you.

7. During the hike, note the damage done to the natural environment by humans. Was economic benefit derived from this damage? Discuss "trade offs."



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CONCEPTS

1. Water is a basic determiner of the type and extent of life found in an ecosystem.

2. The water cycle is one of three basic cycles of raw materials which are absolutely necessary for life.

3. The availability of water within an ecosystem is determined by several factors, including soil type, slope angle, and exposure.

BACKGROUND INFORMATION

Water is essential to the growth and sustenance of all living things. Chemically, water is composed of one atom of oxygen and two atoms of hydrogen (H_2O). It is a tasteless, odorless, and colorless compound. This very simple compound serves as the basis of life.

Up to 90 percent of a plant or animal body is water. Water is a necessary material in the photosynthetic process through which energy becomes available to all living beings. Water also dissolves the nutrient minerals in soil and so makes them available to plants. Animals use water for digestive, excretory, and reproductive purposes. Both plants and animals use water for internal circulation and for regulation of their body temperature.

The water cycle, if uninterrupted, can supply the water needs of all life in a natural area. Water vapor enters the air by evaporation from plants (transpiration) and evaporation from bodies of water open to the air. This vapor condenses in the atmosphere to form clouds. When enough moisture collects, the clouds release this moisture as rain or snow. Some of the water that reaches the earth soaks into the soil and can be absorbed by plants. Some water runs off the surface in streams and rivers or collects in lakes or ponds. This surface water is accessible to animal life. (See Weather and Climate Section for a more complete description of the water cycle).

The amount of water that is available within an ecosystem determines the type of life that the ecosystem will support. But the actual amount of water within a habitat is not as important as the water's availability. The availability of water is determined by several factors, including soil type, slope angle, exposure to evaporation, and rainfall totals.

The available water that exists for any plant is the water present at the plant's root system that can be absorbed. Water that is retained within a soil after a rainfall is known as capillary water. This water is available to the root systems of the green plants in the habitat. As the plants draw out the water in the soil, they reduce the amount of capillary water. If

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BACKGROUND INFORMATION (Cont'd.)

the plants continue to draw on the soil for moisture and the capillary water is not replenished, they will eventually wilt and die. Loss of plants within a habitat will result in more water run off during storms, thus reducing the capillary water supply further and exposing the area to erosion.

Free water is that water open to the air. Animals obtain their needed water from free water and from the bodies of plants and animals they consume. Human beings are not able to obtain sufficient water from the food they eat. They must drink water. The hiker's fresh water supply must come from one of the following sources:

- Water packed in.
- Piped water.
- Free water (if potable).

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain the role of water in shaping any ecosystem.
2. Describe three ways that plants use water.
3. Identify the sources of fresh water accessible to the hiker.
4. List some factors in the environment that control "available water."
5. Identify areas along the route of a hike where variations in "available water" are shown by the plant life supported.

"DOING ACTIVITIES"

1. Draw a diagram illustrating the water cycle and emphasizing its influence on the living community.
2. Make a study comparing the ecosystems of a freshwater pond, a mountain habitat, and the desert in regard to water supply and adaptations by native plants and animals.
3. Find, in any area, two or more plants that illustrate a probable difference in "available water."
4. On a hike, evaluate the total water resources of the area. These should include:
   - Humidity.
   - Ground water.
   - Free water (open to the air).
   - Piped water.

CONCEPTS

1. Erosion is a natural process in dry, arid areas.
2. Erosion in dry areas is caused by two factors: (a) the sliding of dry materials into low areas during the dry season; (b) the movement of materials in channels during the wet season.
3. The geology, climate, and vegetation type of the San Gabriels Mountains cause high rates of erosion.

BACKGROUND INFORMATION

Erosion is a natural process in dry, arid areas where there is too little rain to sustain a thick growth of vegetation. Erosion has been an active process in the formation of the San Gabriel Mountains, and it is evident in the many steep cuts and gullies found throughout the foothills.

Several factors combine to make the San Gabriels particularly vulnerable to erosion: (1) the sandy loam of the soil; (2) the dry Mediterranean climate; (3) the predominance of chaparral; (4) a mean slope angle of 68°; and (5) the high incidence of fire.

Erosion in the San Gabriels takes place throughout the year, although the most of the severe erosion occurs during rainstorms.

In the summer, erosion is caused by the sliding of rocks and dry soil from mountain slopes into gullies. The steep slope of the mountains encourages this type of erosion.

Rains in the San Gabriels can be extremely heavy and have been the cause of severe flooding and mud slides. This is the reason for a series of flood control dams running along the base of the mountains. Since the mountains are dry and of a sandy soil type, rain has difficulty seeping into the ground, particularly during intense rainstorms. The water then rushes over the slopes, taking soil, rock, and debris with it across a broad area. This action is known as sheet erosion.

An additional factor that contributes to erosion in the San Gabriels is fire. After a fire has swept across the hills and destroyed the protective chaparral covering, erosion can be particularly devastating. If a heavy rain falls in an area denuded by fire, the water will sweep the top soil into the gullies, making it even harder for vegetation to take a fresh foothold. Dry erosion is also accelerated after fire. The soil loses the binding influence of the plant cover, and the fire reduces the clumping of the mineral soil itself. Hence, it is more rapidly pulled down by gravity.

Erosion can be prevented by filling in rills that are just beginning; by being careful with fire; by using trails that are marked

BACKGROUND INFORMATION (Cont'd.)

and not taking shortcuts down steep slopes; and by being careful not to disturb vegetation on mountain slopes.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify the major types of erosion at work in the Angeles Forest, such as:
    a. The sliding of dry materials into low areas during dry periods.
    b. The erosion by running water during rainy periods.
    c. Erosion of various types accelerated by humans.
2. List three ways that people accelerate erosion (trail, cutting, disturbing vulnerable slopes, fire).
3. Explain how soil type, slope, and weather factors create special erosion problems in the Angeles Forest.
4. Describe how a badly eroded gulley may eventually affect the area's water table and surrounding vegetation.
5. Explain the positive aspects of erosion. What's good about it?

"DOING ACTIVITIES"

1. Hike through an area and find examples of erosion that happened during the dry season and erosion that occurred during the rainy season.
2. Hike through an area and locate examples of both natural and human accelerated erosion.
3. Examine a hillside and estimate its vulnerability to erosion based on the hill's slope angle, soil, vegetation, etc.
4. Find an example of a badly eroded area and determine what overall affect this will have on the surrounding vegetation and the water supply.
5. Hike through an area and locate examples of how people have decreased the rate of erosion.
6. Work in cooperation with the governing agency of the hike area to control erosion at some vulnerable site.

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CONCEPTS

1. Organic materials can be broken down by micro-organisms as a natural process (biodegradable). Inorganic materials either break down very slowly by chemical processes or not at all (non-biodegradable).

2. There are two primary methods for disposal of inorganic waste: (a) recycling; (b) land disposal.

3. When a person is backpacking or hiking, the only proper way for him/her to dispose of inorganic waste matter is to pack it out.

BACKGROUND INFORMATION

Inorganic materials are the products and by-products of the industrial-urban life style. Waste materials produced by living organisms are consumed as raw materials by other organisms, and are therefore termed biodegradable. This prevents an accumulation of waste matter that would eventually bury life and destroy the ecosystem. Unfortunately, the same process does not apply to products from factories. True, plastics and rubber, which industries produce, are made from organic matter, but their chemical make up prevents their being absorbed by the earth once they are thrown away.

Corrosive resistant metals used in tin cans and other metal containers do not deteriorate rapidly. This resistance persists long after these products have been discarded. As a result, an ever-increasing amount of non-biodegradable waste is accumulating in the environment.

Two general methods are used to deal with inorganic solid waste: (1) recycling the matter; (2) accumulating the matter. Through industrial processes, it is possible to reclaim and reuse the raw materials in aluminum cans, glass bottles, scrap metal, newspapers, etc. Recycling offers a double benefit since it permits people to use and reuse raw materials and prevents the unsightly and purposeless accumulation of waste.

The most common technique used to dispose of accumulated garbage is to deposit it in a dump. Open dumps are ugly and potential sources of disease. A much better method of disposal is the sanitary landfill technique, in which each layer of waste is covered with a layer of soil or gravel.

Still, disposal has two major drawbacks. Certain non-renewable supplies of metals (particularly copper, zinc and lead) are lost and the nature and character of the land are changed. Sometimes, however, waste disposal in this way may be beneficial, such as when filling in may be seen as swamp land to make it available for development.

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BACKGROUND INFORMATION (Cont'd.)

If the work is not done properly, patterns of water run off may be adversely affected, causing water pollution and possible flooding.

Backpackers and hikers should carry out any non-biodegradable trash unless waste disposal containers are available. If fires are permitted, paper goods can be burned. If fires are not permitted, paper should also be packed out. Any food not consumed should be buried. Micro-organisms and insects in the soil will recycle it.

CURRICLUM OBJECTIVES

Students will be able to:

1. Distinguish between biodegradable and non-biodegradable matter.
2. Describe how an ecosystem is damaged by the accumulation of inorganic waste.
3. Identify five types of inorganic waste accumulated in their homes and five types of industrial land pollution.
4. Cite two examples of recycling techniques and land disposal techniques for inorganic waste.
5. Demonstrate an understanding of the proper way to dispose of plastic or metallic waste in the mountains.
6. List three ways in which resources are conserved through the use of recycling methods.

"DOING ACTIVITIES"

1. Spend one-half hour of hiking consciously collecting trash to pack out or to deposit in campground waste receptacles.
2. From the amount of inorganic garbage accumulated in the home in a single day, ask students to estimate the total amount of inorganic waste the city produces in a single day.
3. Conduct a study of some type of inorganic waste that is currently being recycled. What are the economic and ecological benefits from recycling such materials? Does recycling have any negative effects?
4. Visit a recycling center and a sanitary land fill. Make an oral report comparing and contrasting the two techniques; suggest other ways to dispose of waste.

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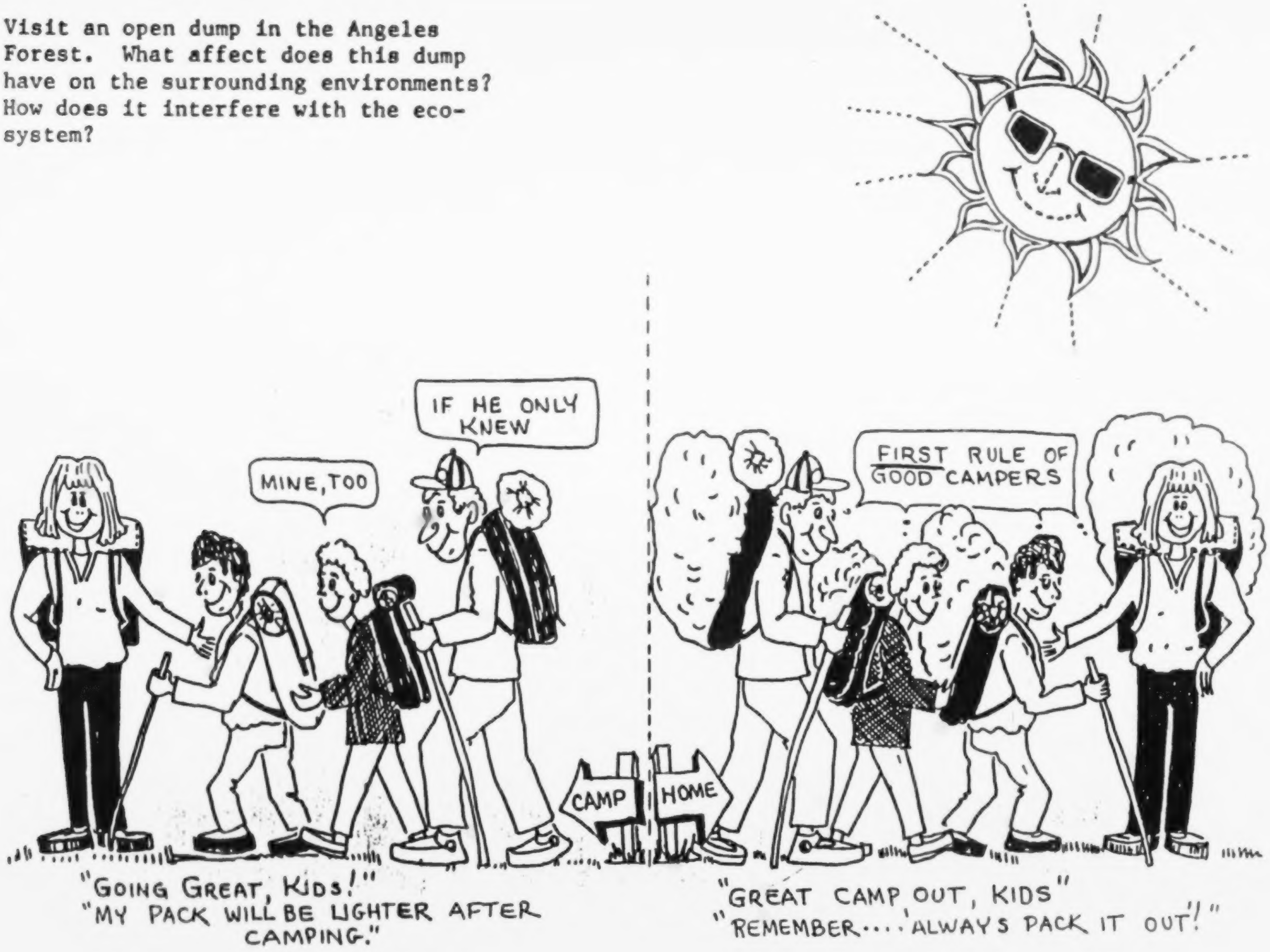
"DOING ACTIVITIES" (cont'd.)

5. Visit an open dump in the Angeles Forest. What affect does this dump have on the surrounding environments? How does it interfere with the ecosystem?


IF HE ONLY KNEW
MINE, TOO
CAMP
HOME
FIRST RULE OF GOOD CAMPERS
"GOING GREAT, KIDS!"
"MY PACK WILL BE LIGHTER AFTER CAMPING."
"GREAT CAMP OUT, KIDS"
"REMEMBER.... 'ALWAYS PACK IT OUT'!"

CONCEPTS

1. Fire has had a major impact on the environment of the mountains for hundreds of years.
2. Fire is actually beneficial to the health and propagation of many mountain plant species.
3. The two major causes of fire in the mountains are people and electrical storms.
4. People are forced to combat mountain fires because of human living patterns.
5. Various techniques are used for controlling and suppressing fires.

BACKGROUND INFORMATION

Fire has been a natural phenomenon in the environment of the San Gabriel Mountains for hundreds of years. Since fire has been such an active force in the mountains' ecosystem, forest and plant life have adapted to its presence. This is particularly true of the chaparral that covers most mountain areas up to 5,000 feet. Scrub oak, manzanita, laurel sumac, chamise (greasewood), and other plants depend to a certain extent on fire for new growth and/or for the propagation of their seeds.

It is an unusual relationship. But, during the long summer months, the chaparral becomes very dry, and the hillsides turn brown from the dormant and dying brush. A fire sweeping through this "timberland," especially if spurred on by gusty Santa Ana winds, can reduce the brush to ash within a matter of minutes. Within a few months, however, fresh green shoots will appear from the surviving root crowns. Many seeds, buried in the earth and possibly dormant for years, will suddenly sprout due to the fire's heat.

Yet, even as the fire gives the chaparral a fresh start, it is destroying the protective watershed covering the slopes. A severe fire will make the slopes a prime target for erosion. Unchecked fires that sweep through the foothills into the pine and conifer forests destroy both public and private property.

The incidence of fires in the San Gabriels has increased with the growth of population in the area. Although three hundred years ago fires were started almost entirely by electrical storms, today the majority of fires are caused by people. It is interesting to note, however, that the frequency of burn in any given area has gone unchanged. Where occasional fires of one hundred years or more ago raged unchecked over very large areas, today's frequent fires are suppressed and their area of burn limited.

As fire increases the rate of erosion and can cause millions of dollars of damage,

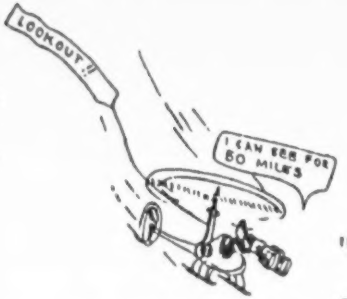
BACKGROUND INFORMATION (Cont'd.)

people must continue to suppress every fire that begins in the San Gabriels. Various techniques have been developed to help control and prevent fires. The U.S. Forest Service maintains an aircraft patrol to detect fires; its crews clear wide fire breaks along the ridges of mountains to give fire fighters quick access to fires and to help keep fires from spreading; and well-trained fire-fighting teams are maintained in or near the forest throughout the fire season.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain how a fire burning through mountain plant cover could have both good and bad effects.
2. Identify one species of chaparral that has adapted to the incidence of fire and describe how it has managed to do so.
3. Describe the effect of fire on soil erosion and water runoff.
4. Identify the two most common causes of fire in the mountains as the activities of people and the occurrence of electrical storms.
5. Describe, in detail, one technique for controlling and/or suppressing fire.
6. Explain why people must continue to suppress fires in our mountain vegetation.


LOOKOUT!!
I CAN SEE FOR 50 MILES

"DOING ACTIVITIES"

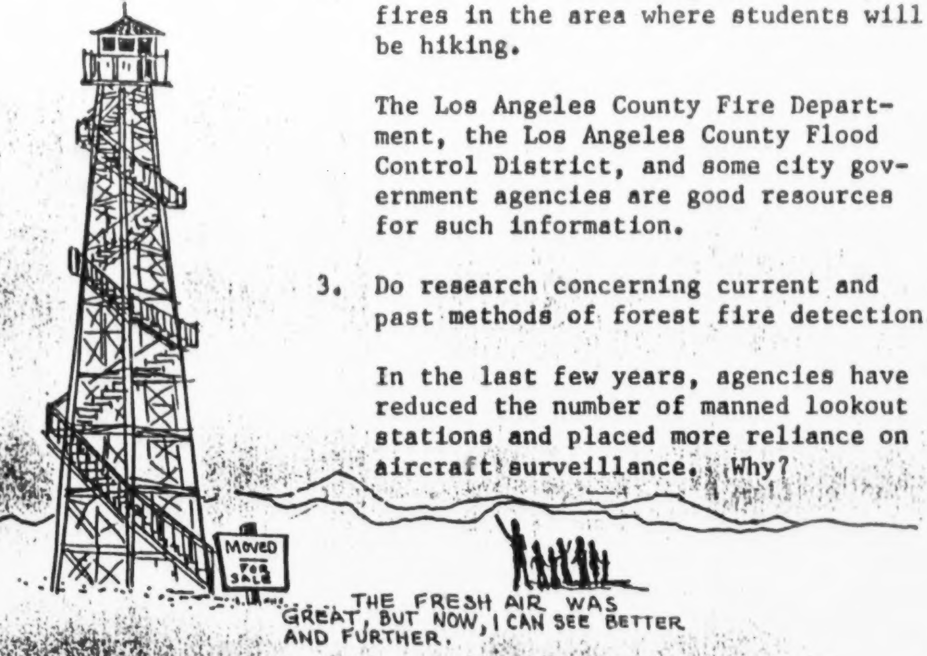
Students will be able to:

1. Search the area of study for evidences of fire and give a reasonable explanation regarding the fire's probably origin and how long ago it occurred.
2. Do research concerning the history of fires in the area where students will be hiking.

   The Los Angeles County Fire Department, the Los Angeles County Flood Control District, and some city government agencies are good resources for such information.

3. Do research concerning current and past methods of forest fire detection.

   In the last few years, agencies have reduced the number of manned lookout stations and placed more reliance on aircraft surveillance. Why?


MOVED
FOR SALE
THE FRESH AIR WAS GREAT, BUT NOW, I CAN SEE BETTER AND FURTHER.

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"DOING ACTIVITIES" (Cont'd.)

4. Using a map and personal observation, study the area in which the hike will be conducted and locate the nearest:
   - Fire lookout station.
   - Fire suppression unit.
   - Point to report a fire.
   - Fire break.
   - Access road.
5. Choose a specific area they feel would be an especially bad place for a fire to break out, and explain the reason for their choice.

CONCEPTS

1. The radiant energy of the sun is basic to all food chains.
2. Food energy diminishes as it passes through a food chain.
3. In any living community, the feeding patterns develop a series of interlocking chains called a "food web."

BACKGROUND INFORMATION

A food chain represents the dependent relationships between the plants and animals in an ecosystem. Basic to all food chains is the energy of the sun. The sun provides the energy for the growth and chemical processes of green plants (producers). Green plants, in turn, provide food—and, thus, energy--for animals known as herbivores (plant eaters). The herbivores are also known as "first-order consumers" since they derive their food directly from the producers. Rabbits and deer are herbivores. Animals that feed on herbivores are called carnivores (meat eaters) or "second-order consumers." The coyote and mountain lion are carnivores. Animals that eat both plants and other animals are called omnivores; bears and people are omnivores.

A simple food chain relating producers, herbivores, and carnivores would look like this:

grass seeds ⟶ mouse ⟶ coyote

Energy passing through this chain is gradually diminshed from the grass seed to the coyote. To feed the coyote, there must be many mice, who must have an adequate supply of grass seeds. Obviously, then, the amount of plant material produced in an area is the determining factor as to the size and variety of the animal community.

At the end of all food chains are the decomposers. Decomposers feed on dead organisms, returning the minerals to the soil. Bacteria and fungi are decomposers.

Food chains are not separate and distinct lines but interconnect to form food webs. Other herbivores, such as birds and squirrels, will feed on the grass seeds and other carnivores will feed on the mice. The coyote becomes a herbivore when it eats grasses and berries. A food web shows all the connections and interconnections between an ecosystem's plans and its animals.

CURRICULUM OBJECTIVES

Students will be able to:

1. Draw a diagram of a simple food chain showing an energy source, one producer, two consumers, and a decomposer.

CURRICULUM OBJECTIVES (Cont'd.)

2. Explain the differences between a food chain and food web and describe these terms in relation to one another.

3. Explain the effect on at least one food chain of the removal of a living organism from an ecosystem.

4. When given a complete diagram of a food web, identify producers, herbivores, carnivores, and decomposers.

"DOING ACTIVITIES"

Students will be able to:

1. Choose a plant and describe how that plant is part of a three-'or four-level food chain.

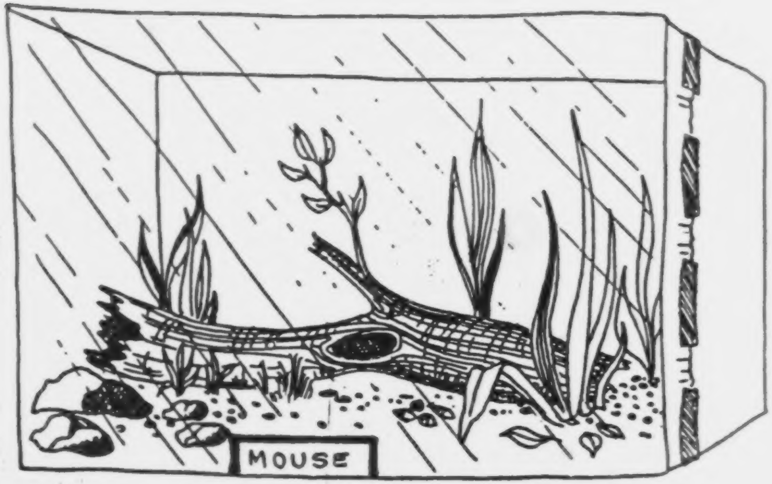
2. Study any plant for a half-hour, and prepare a report on the animals found to be associated with it (pollination, shelter, feeding, etc.).

3. Find evidence of one plant and one insect used for food by at least three different consumers.

4. Build a visual food web with the help of other students to portray various plants and animals. Use lengths of twine to show connections within the web.

5. Prepare a grocery shopping list, and determine how each food item can be traced back to a green plant. Using this information, draw a diagram to show the relationship of human beings to the plants and animals they consume.

6. Make a "shoebox" niche of a Southern California mammal and write a description to accompany it.



CONCEPTS

1. An ecosystem consists of interdependent living organisms and their nonliving physical environment.

2. All life within any ecosystem is dependent on the ability of green plants to capture solar energy.

3. The biological portion of an ecosystem includes producers, consumers, and decomposers.

4. Energy is neither produced nor recycled in an ecosystem, but the available energy is progressively diminished within it.

BACKGROUND INFORMATION

Ecology is the study of the relationships between living organisms and their physical environment. The word is derived from the Greek "oikos," meaning home or house. An ecosystem is the complex interaction of plants, animals, soil, air, and water within their home--the Earth.

An ecosystem is normally thought of as an interreated functional unit within the biosphere. A lake or stream, a coral reef in the ocean, and the chaparral area of the Angeles Forest are all examples of ecosystems. In the largest sense, the entire Earth is a unit and so can be considered the ultimate ecosystem.

Energy is required by the plants and animals within an ecosystem to maintain their life processes. Light from the sun provides this energy. The green plants within an ecosystem use the sun's light energy to produce organic compounds from water and carbon dioxide. This process is known as photosynthesis. Since plants are able to produce organic food from inorganic matter, they are known as the "producers" of an ecosystem.

Animals that feed on plants or other animals are known as "consumers." Organisms, like bacteria and fungi, that feed on dead organic matter are called "decomposers." Producers, consumers, and decomposers form the biological portion of an ecosystem.

Ecosystems function in a dynamic manner on energy and nutrients continually flow through them. Energy flows only one way and is diminished through the respiration process in plants and animals. Producers receive no usable energy from decomposers. A producer's energy comes only through photosynthesis.

Nutrients, however, are recycled. The decomposers break down organic matter, thus releasing mineral nutrients into the soil where they can once again be absorbed by plants.

CURRICULUM OBJECTIVES

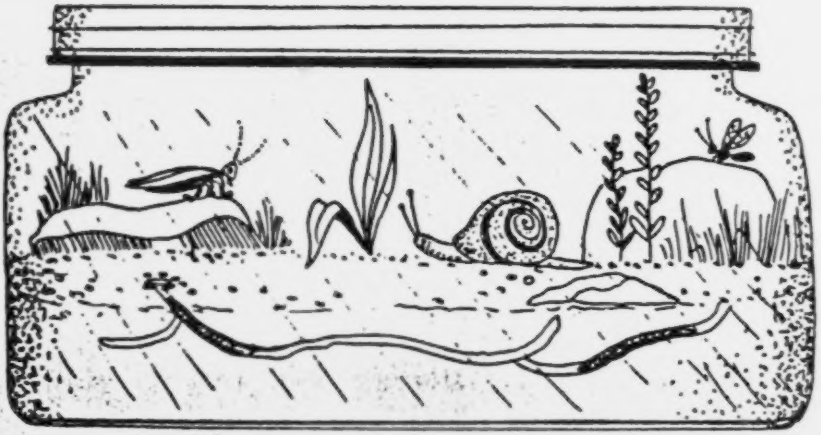
Students will be able to:

1. Define accurately the term "ecosystem."
2. Explain why photosynthesis is the basis of all plant and animal life.
3. Describe a specific ecosystem in the mountain environment, including energy source, living organisms, and physical setting.
4. Identify the cycling of any material the student chooses through a local ecosystem.

"DOING ACTIVITIES"

Students will be able to:

1. Draw a diagram of the basic components of a mountain/desert/ocean ecosystem.
2. In a measured area of the forest, estimate the proportions of shade and sunlight; of dense forest and open forest.
3. Make "sunprints" of any leaf in broad sunlight, partial shard, and deep shade and relate these to the plants normally receiving such exposure.
4. Search through the area of study for an interesting decomposer (plant or animal), and present a written or oral report on how this organism fits within the ecosystem.
5. After studying the area, describe three different ecosystems.
6. Build an ecosystem in a jar or plastic container.



CONCEPTS

1. Air is composed of 79 percent nitrogen, 21 percent oxygen, .03 percent carbon dioxide, and several other gases in smaller quantities.
2. Oxygen and carbon dioxide are cycled between plants and animals.
3. Aquatic organisms are adapted to obtaining their oxygen and carbon dioxide from the water.
4. Air movement (winds) can affect humidity, soil erosion, and air temperature.

BACKGROUND INFORMATION

Air is a mixture of gases, the most important being nitrogen (79 percent), oxygen (21 percent), and carbon dioxide (.03 percent). Oxygen and carbon dioxide are used by organisms in the carbon-oxygen cycle.

In this cycle, animals breathe in oxygen and breathe out carbon dioxide, while plants take carbon dioxide from the air and release oxygen back into it. Plants use the carbon dioxide in the photosynthetic proces to produce glucose (simple sugar). Some carbon dioxide is returned to the atmosphere by the respiration of both plants and animals, but more is released through the decay of dead organisms.

Since the amount of oxygen within aquatic environments is less than that in the air, organisms living in the water have respiratory organs adapted to obtaining sufficient oxygen in an environment of this type. Carbon dioxide is usually present in ample amount to meet the needs of aquatic plants and animals.

The movement of the air (wind) is an important factor in determining the type of life which can exist within an ecosystem. Breezes and wind are dynamic forces that bring fresh supplies of oxygen and carbon dioxide to the organisms. But the wind also affects the temperature, rainfall, and humidity of an ecosystem. Winds control the weather and the amount of moisture that is transported from the sea to the land. In dry, sandy areas, winds encourage erosion by removing the soil from the root base of trees and other plants and by sweeping away the topsoil from exposed slopes. Ecosystems that receive a great deal of wind are characterized by stunted plant growth and erosion. The plants in such an area will also be bent or slanted in the direction of the wind's path. Because of their relatively large size, this phenomenon is most evident in trees.

CURRICULUM OBJECTIVES

Students will be able to:

1. List the main gaseous components of the air.
2. Explain how green plants help purify our air supply.
3. Draw a diagram of the carbon-oxygen cycle.
4. Describe how air movement (wind) affects the area of study.

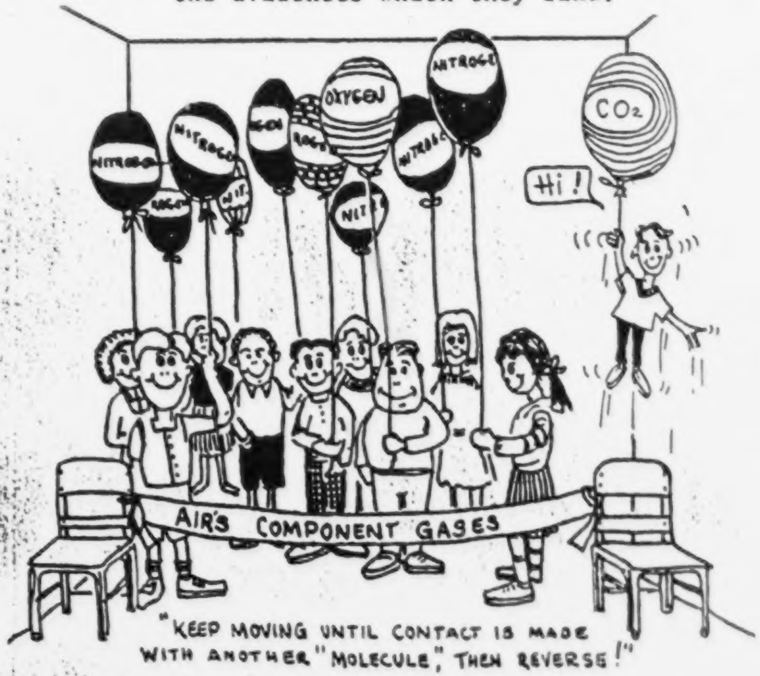
"DOING ACTIVITIES"

Students will be able to:

1. Visualize the air's component gases, by participating in role playing of air molecules. In a 10 foot square, identify eight students as nitrogen molecules and two as oxygen molecules.

   Ask each of the 10 "molecules" to move until contact is made with another "molecule" and then to reverse direction until another contact is made. Continue this motion. The add one more student (shortest in the class?) and explain that only three tenths of one percent of air is carbon dioxide.

2. Use the activity described above to understand further how the chemically "active" gases in air relate to plants and animals.
3. When told that the average human cycles 20 cubic feet of air per hour, describe visually the dimensions of this amount of air to the entire group (2 ft x 2½ ft x 4 ft = 20 cubic feet).
4. In an area of study, find evidences of the wind's effect on soil erosion and tree growth. List or describe the evidences which they find.


NITROGEN
NITROGE
OXYGEN
NITROGE
NITROGE
NIT
CO2
Hi!
AIR'S COMPONENT GASES
"KEEP MOVING UNTIL CONTACT IS MADE WITH ANOTHER "MOLECULE," THEN REVERSE!"

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CONCEPTS

1. Soil is basically a mixture of minerals and organic matter.
2. Soil types are determined by parent material, water abundance, and the amount and type of life.
3. The texture, the amount of water retained, the temperature, and the pH (acidity-alkalinity) of a soil all determine what types of plants and animals will live in a specific place.
4. Individual layers of soil are called horizons; together these horizons form a soil profile.
5. Soil is built very slowly in areas like Southern California, which is very dry and where the falling of leaves is limited.

BACKGROUND INFORMATION

Soil is a dynamic, active part of every ecosystem. It is affected by the climatic conditions in which it is situated, by the materials which compose it, and by the organisms that live on and in it.

Soil is made up of four basic parts: (1) inorganic material; (2) organic matter; (3) water; and (4) air.

The inorganic material, or minerals, that form the base of all soils comes from the soil's parent material. This material may come from the weathering away of hard rock surfaces or from the flooding of rivers.

Humus, which is decayed organic matter, is added to the soil through the action of bacteria and molds in decomposing any dead organisms or parts of organisms (leaves, branches, etc.). Bacteria also contributes to the soil by producing usable nitrogen. Other living organisms, such as one-celled protozoons, ants, beetles, earthworms, and burrowing animals, add to the life and nature of the soil by their feeding and excreting processes.

Air and water fill the gaps between the solid particles composing the soil. The ratio between the amounts of air, water, and mineral particles in a soil determines how hard or porous it will be and what type of plant or animal life it will support.

Another factor that determines a soil's fertility is its relative acidity. The acidity of a soil is determined by the concentration of hydrogen ions in the soil and is expressed as a soil's pH. A low pH level means the soil is acidic. A high pH level means the soil is basic or alkaline. Most dry soils are slightly basic, and the plants are adapted to it.

The basic composition of a soil can be de-

BACKGROUND INFORMATION (Cont'd.)

termined by the analysis of a soil profile. A soil profile can be obtained by cutting vertically into the soil and exposing the soil's layers from the surface to the hard, rocky parent material. These layers are called horizons and are designated by the letters A, B, C. The A-horizon corresponds to the layer of partially decomposed materials; the B-horizon contains primarily mineral matter; and the C-horizon contains the weathering or decomposing parent material. Below this is the hard rock base.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe the processes that produce soil,
2. Explain what a "soil profile" is and how it is formed.
3. Differentiate visually between topsoil and subsoil, and explain the difference between the two.
4. List three soil factors that affect an ecosystem.

"DOING ACTIVITIES"

Students will be able to:

1. Locate an exposed soil profile and evaluate the depth of topsoil, subsoil layers, and parent rock.
2. Stake out an area of one square meter of uniform soil, and sift through the top three inches, recording the evidence of plants and animals observed.
3. Locate a contiguous area where an abrupt difference in plant character is obvious, and give a reasonable explanation for this difference.

   Either differences in soil water or in the physical make up of soil are usually the reason. If soil test kits are available, determine actual mineral differences.
4. Study the organic matter in their soil sample and differentiate between:

   Litter - Dead things on the surface that are identifiable.

   Duff - Partially decomposed, compacted organic matter.

   Humus - Almost completely decomposed, non-identifiable organic matter.

HUMAN INFLUENCES

CONCEPTS

1. The main rule of thumb used to manage the forest lands has been "the greatest good for the greatest number."

2. Wilderness areas have been specifically set aside by the U.S. Forest Service to minimize human influences.

3. The mountain areas of Southern California are managed by a number of public agencies; and, at times, this policy has complicated jurisdiction and lines of control.

4. Access roads increase public usage and necessitate further modification of the natural environment.

5. Whenever hiking or camping, a person should be aware of the rights and privileges of other visitors.

BACKGROUND INFORMATION

The U.S. Forest Service manages the national forests and grasslands of America according to the rule "the greatest good for the greatest number." This rule has been duly applied in the Angeles National Forest, which has more than 6 million visitors yearly.

The Angeles National Forest was initially established by President Benjamin Harrison in 1892. From that time until 1938, the mountains in this area were accessible only to hardly hikers, but a series of destructive floods and the construction of the Angeles Crest Highway resulted in great changes. The severe flood of 1938 wiped out miles of hiking trails, but the Angeles Crest Highway (begun in 1929) ran the length of the mountains by the late 1950's. The majority of people visiting the Angeles Forest now do so by automobile.

The great number of visitors driving and hiking through the San Gabriel Mountains has altered--and, in many places, destroyed --the wilderness aspect of these mountains. Wildlife that was once common to the San Gabriels (e.g., the great California condor and the grizzly bear) have long since disappeared. Black bear, lynx, and mountain goat can still be found, but only in small numbers.

The many kinds of wildlife in a mountain habitat are an integral part of its ecosystem. When the pressures of human population significantly alter a wilderness ecosystem, the rule "the greatest good for the greatest number" may be rightly challenged.

To help preserve some of the true wilderness in the Angeles National Forest, the San Gabriel and Cucamonga Wilderness Areas were created. The number of visitors to

BACKGROUND INFORMATION (Cont'd.)

these areas is limited. People who plan to enter the areas must obtain hiking and fire permits from the U.S. Forest Service.

It is very important for students to understand the impact of human influences on the environment. They should have a clear understanding of their personal impact on the environment as well as that of larger human projects (dams, highways, etc.).

In a survival situation, however, human welfare is of primary concern. In all other situations, there must be a reasonable attempt to protect the environment.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain the reasons for establishing Wilderness areas on lands controlled by the U.S. Forest Service.
2. Describe the priorities followed by various agencies in managing Southern California mountain lands.
3. Identify any public agencies that have legal jurisdiction over the area of study.
4. Identify any property in the area of study that is privately owned or controlled.

"DOING ACTIVITIES"

Students will be able to:

1. Study the history of the U.S. Forest Service as it relates to the formation and preservation of Wilderness Areas.
2. Study a map of a mountain area and list all public agencies and private interests that exert some influence over the area of study.
3. Prepare to debate on either side of the question: "Resolved, that the public should have unlimited access to all U.S. Forest Service lands."
4. Use a map of the area in proposing the location of an imaginery new access road. Explain its probable effect on the area.

   Maps of the San Gabriel Bear Canyon and Devil's Canyon Wilderness Area are easily obtained.
5. Conduct a mock debate on the proposed designation of a specific forest site as a Wilderness Area. Students will represent spokespersons for:

   - A lumber company.
   - The U.S. Forest Service.
   - The County Fire Control.

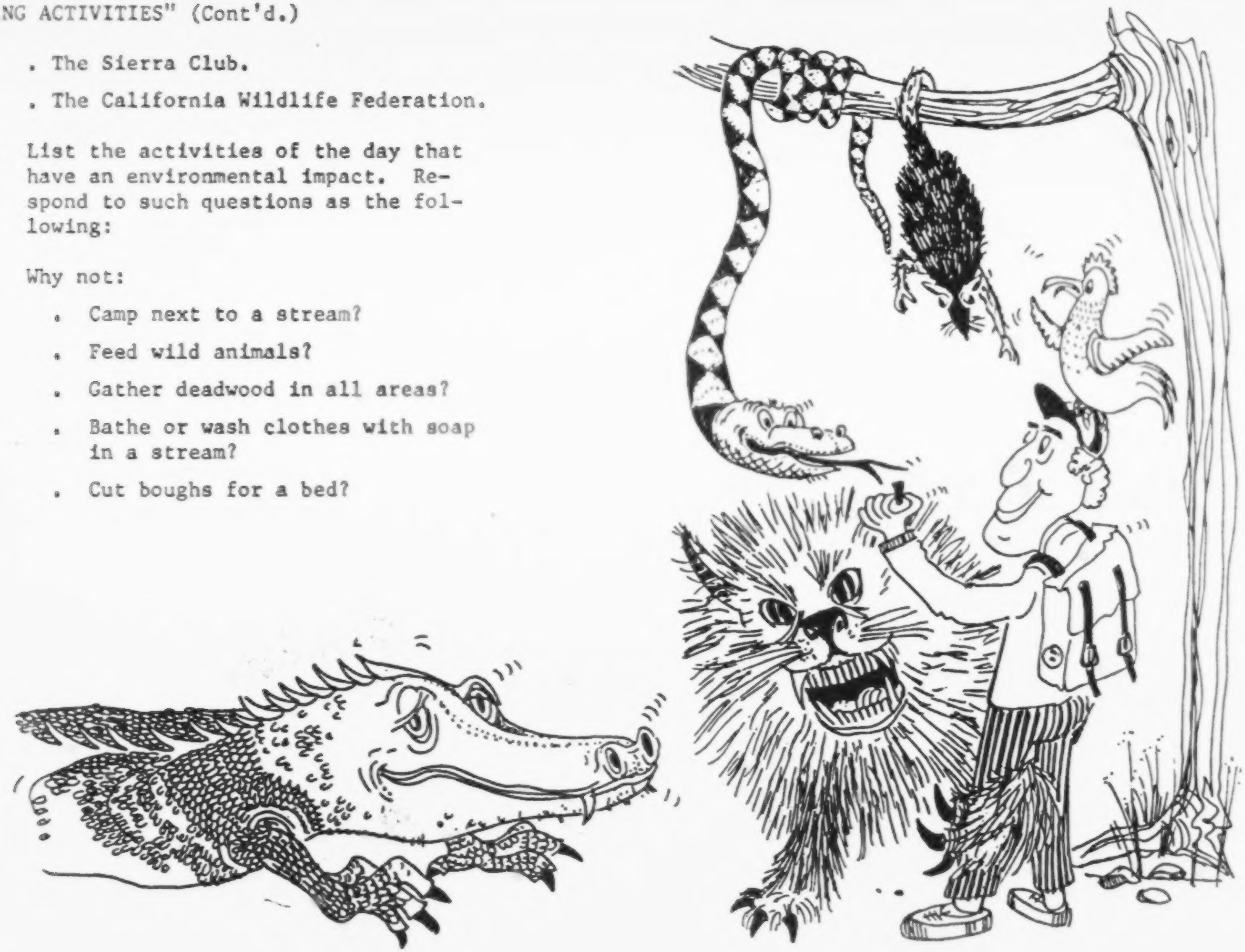
"DOING ACTIVITIES" (Cont'd.)

- The Sierra Club.
- The California Wildlife Federation.

6. List the activities of the day that have an environmental impact. Respond to such questions as the following:

   Why not:

   - Camp next to a stream?
   - Feed wild animals?
   - Gather deadwood in all areas?
   - Bathe or wash clothes with soap in a stream?
   - Cut boughs for a bed?



CONCEPTS

1. Insects are among the most prevalent of all animals.
2. Insects have adapted in ways to make themselves prevalent.
3. Insects have some limitations.
4. Some of the best allies of humans in combating insect pests are other insects and related arthropods.
5. Some spiders spin a unique trap.

BACKGROUND INFORMATION

Insects are the most prevalent animals on the Earth. They can be found everywhere.

Humans have been plagued by insects since their cave days. Insects have robbed humans of their food supplies; harassed them and their domestic animals; and, in general, abused their home. With all their brain power, humans have tried to combat the insects, and yet they survive and flourish. What makes insects so tough?

One of the reasons for the durability of insects seems to be their size. Most insects are no larger than one-half inch. Therefore, they need little food or room and can easily hide.

Another advantage is their rapid rate of reproduction. A study of aphid populations showed that thirteen generations were reproduced in one season. It is estimated that one hundred off-spring came from one female. Other species are equally prolific.

As a group, insects have fantastic ability to adapt genetically to bad conditions. Because of their ability to reproduce rapidly in great numbers, a sufficient number survive and reproduce even under adverse conditions. Each generation is better able to live under the circumstances that destroyed their forebearers. The immunity to certain pesticides shown by some insects today is an example of their adaptability.

With all their durability, insects do have a few limitations. One is that insects are cold-blooded. They are unable to maintain body heat. As the temperature drops in the winter, they die. Another limitation is that many insects are subject to fungus growth and parasites.

Probably the greatest of the insects' problems is that the "world" is seeking to destroy them and that many of their enemies in this battle are other insects. Many beetles capture leaf-eating insects. Some insects lie in ambush and capture their "kin." For example, mantids are now raised commercially and shipped all over the world for the express purpose of killing leaf-eaters.

BACKGROUND INFORMATION (Cont'd.)

Another very common but useful insect is the ladybird beetle. The female ladybird beetle lays her eggs on plants that are infested with aphids. Upon hatching, both mother and offspring attack the pests. Sometimes ladybird beetles are attacked by ants who protect the aphids for the nectar secreted by them.

Other insects that are beneficial include the predatory wasps, parasitic flies like the tachinia fly that lay eggs on caterpillars, and the ichnuimid flies. Dragon flies and their nymphs are also great hunters and can be found along streams and lakes.

After first contaminating the environment with insecticides, humans are now using a new approach to eradicating insects pests in the form of insect chemicals. Some researchers are using odors (pheromones) to eradicate insects.

Keeping insects young by using a juvenile hormone is another approach being studied. This hormone has dangers, however, since it affects insect friends as well as insect pests.

Botanists are also working on developing plants that are more resistant to different insects. Some have been created and now need to be cultivated commercially.

Although not an insect, the spider belongs to the same large group as the insects--the arthropods. They differ in body structure and the number of their legs.

Spiders use two principle methods of catching food. One group snares its quarry by making webs, and the members of the other group hunt for their food.

Most web spiders have their traps in operation 24 hours per day. After an insect hits the web, the spider rushes out and throws more strands on the insect and immobilizes it with a bite that is poisonous.

One might ask, "Why doesn't a spider become caught in its own web?" The answer is that there are two types of web strings, plain and sticky. The plain strands are those that radiate from the middle of the web. The sticky strands are those that form circles around the plain strands. The spider knows where to step.

While hiking in the local mountains, students do not often observe arthropods because they are so small. But, every now and again, one specific arthropod may find the hiker. These are the ticks.

After a day of hiking, it is wise to ask a member of the group to check for "hitch hikers." Tick inspections at rest stops are also helpful because these creatures often drop on a hiker or camper and then

BACKGROUND INFORMATION (Cont'd.)

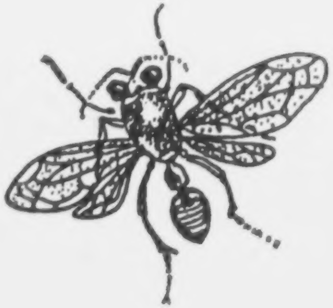
fasten themselves onto the skin. Ticks will "hitch" a ride by latching onto a passing host from a vantage point such as a leaf or stem tip. Once on a body they tend to move toward the warmest parts of your body. They want a meal of blood. These pests should be removed quickly, using the method described in the First Aid section.

During the warm months, the arthropods are most noticeable. A hiker can see butterflies, grasshoppers, bees, wasps, dragon flies, flies, and the ever-present mosquitoes and ants. During the cold months, however, the hills are virtually void of insects. The combination of cold weather and cold-bloodedness is not conducive to activity.

CURRICULUM OBJECTIVES

Students will be able to:

1. List some characteristics that make insects so prevalent.
2. List the characteristics which are limitations to insects.
3. List some insects that are the allies of human beings.
4. List the different types of biological controls of insects that are being used by humans.



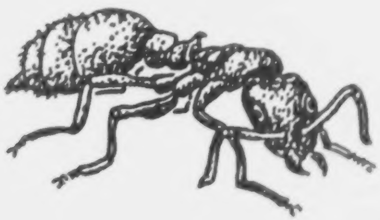
"DOING ACTIVITIES"

Students will be able to:

1. Observe and record how ants react to the following:
    a. A small amount of food placed next to a trail.
    b. A blocked entrance to an ant hole.
    c. A dead insect lying on the trail.

    Did all the ants become involved? In which instance did they become the most excited? Did they all stop what they were doing and begin another task?

2. Collect specimen ants, butterflies, beetles, and flies. Observe and discuss how each is different from the other. Explore how the insects are categorized. Discuss what makes them so durable as you study their body structure.



CONCEPTS

1. Birds are adapted to flight in many ways.
2. Some birds are planters, while others are weeders.
3. Birds are important in the control of pests.
4. Predatory birds have special adaptations for hunting.
5. Bird scavengers do an important clean-up job.
6. Scientists are still studying the navigational powers of birds.

BACKGROUND INFORMATION

Birds are descendants of species of reptiles which had been able to fly. Unlike the reptiles, birds are warm-blooded and have adapted their bodies to flight.

Among the most important adaptations of birds are their hollow bones, air sacs, aerodynamic shape, powerful muscles, and feathers.

Birds are useful to the environment in many ways. Many plants depend on birds for dispersal of seeds. Some seeds are protected by a hard outer coat that enables them to travel through the digestive system unaffected. In this way, seeds can be transported great distances from the places where they were eaten.

Birds are also good weeders. Sparrows have a grinding mill gizzard. The grinding surface of the gizzard, aided by stones swallowed by the bird, mashes the seeds. Tons of weed seeds are consumed, and they are removed before the weeds can grow.

Birds are useful in the control of insects. As a group, birds need a great deal of food. They spend most of the daylight hours looking for something to eat because of their rapid metabolism, small size, and limited ability to store fat.

Insects are caught in the air, picked out of the ground, and taken from the trees. Some birds have special tools to make catching the insects easier. Some are equipped with big mouths to scoop up prey such as the Nighthawks which can be observed at twilight. Woodpeckers have tong-like feet and skulls which can withstand the constant pecking. As you walk through certain habitats, it is not uncommon to hear the pecking of the Red-Shafted Flicker.

Among the worst pests that humans have had to combat are the rodents. Predatory birds, such as the hawk, destroy vast numbers of them. The hawk has many adaptations for

BACKGROUND INFORMATION (Cont'd.)

hunting. It has fast reactions, perfect flight control, expert timing, precision in spot location, and keen eyesight.

In the mountains of Southern California, the Red Tailed Hawk can be seen gliding through the air and searching for prey.

Owls are equipped with specially adapted organs of sight. Like the hawks, their ability to see objects is greater than that of humans. For example, the Great Horned Owl has two-eyed forward type vision and pupils that open extremely wide to admit all possible light. When darkness falls, however, these birds depend on their keen sense of hearing to search for food. Again this is a specially adaptive feature to aid an animal to survive. Although owls are not seen during the day in their natural environment, they can be detected at night by the strange sounds which they make. Sometimes, they make themselves known by leaving along the trail undigested food pellets of rodent's fur that have been regurgitated.

Although some feel they are not beautiful, vultures have an important role as nature's sanitation detail. Vultures soar in the sky until they see carrion and then swoop down to feed upon it. This type of bird has well-developed, long wings that are equipped with two big muscles. The vulture's wings are very sensitive, and the slightest change sends impulses to the muscles.

Vultures can eat an animal carcass that is badly decomposed because they are immune to toxins and botulism microbes that would make most animals sick.

While camping in the mountains, a person is sure to meet the inquisitve and bold jays. The Stellar Jay lives in the riparian (stream) community and also in the higher elevations among the oaks and conifers. The Stellar Jay can be identified by the crest on its head. The other common species found in the mountains of Southern California is the Scrub Jay. It is particularly common in the dry chaparral and exposed foothill regions.

The ability of birds to navigate has puzzled researchers. Whatever the reasons it's remarkable how birds can migrate from north to south and terminate their trips at precise locations.

CURRICULUM OBJECTIVES

Students will be able to:

1. List ways that birds are adapted to flight.
2. List ways that birds help control and clean up the environment.

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CURRICULUM OBJECTIVES (Cont'd.)

3. Recognize that birds have physical characteristics that are adapted to food gathering.

4. Describe the role that birds have in the dispersal of seeds in weeding plants.

5. Classify and identify birds on the trail according to their camouflage and their personal characteristics which contribute to their survival.

"DOING ACTIVITIES"

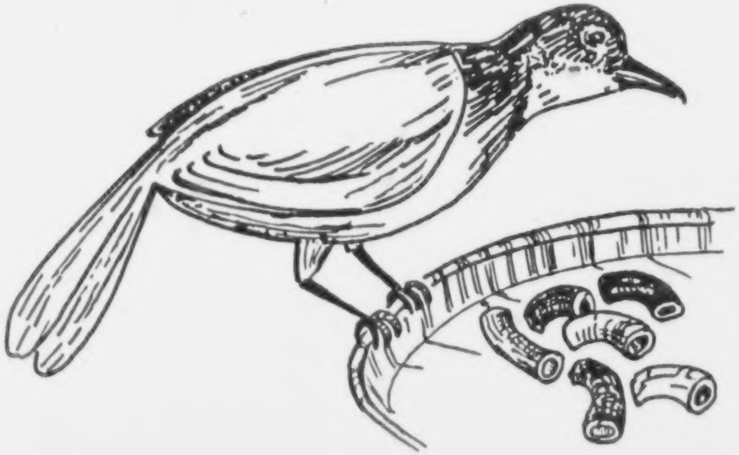
Students will be able to:

1. View films which will help them become familiar with various birds and their adaptations.

2. From a blind (area where the students can remain unseen and yet have a good view of the birds), observe how many types of birds are attracted to the area. If this activity is conducted at the school, students can also set up a feeding station.

3. Dye cooked macaroni, and set it out where birds may feed on it. Observe what color the Scrub Jays prefer. Perform this experiment at least twice, and discuss the results.

4. Conduct research concerning the ability of birds to see colors and relate the outcome to the experiment in #3.



I DON'T LIKE MACARONI, BRING ON THE WORMS!

CONCEPTS

1. Protists are the primary decomposers of the soil.
2. Small arthropods also add to building the soil.
3. Mammals living in the soil have adapted to that environment.
4. Earthworms aid in enriching the soil.

BACKGROUND INFORMATION

As a person looks at the landscape, he/she can observe rocks, plant, and soil. The person does not see many remains of dead animals, however. The reason is that there are decomposition teams.

The first decomposition group are the protists. Protists include the microscopic organisms that can breakdown the bodies of dead plants and animals into simple molecules which plants can absorb and use. Without this process of replacing nitrogen in the soil, all plant growth would eventually stop. If that happened, animals could not live.

The protists include some types that are like animals in behavior. They move by means of whip-like tails or hair-like processes, others flow like molasses. Because protists need moisture, they are found in the thin film or water that sticks to soil particles. Some eat bacteria, and others eat materials that are decomposing. Protists themselves then release nitrogen compounds back into the soil.

Many other small organisms aid in the building of soils. One of them is a worm-like creature called a nematode. Some of these are equipped with teeth that grind down soil particles.

When a person turns over a rock or piece of wood, he/she usually finds all kinds of living things. First, there is the sowbug or wood louse, as it is sometimes called. It is not really an insect, but a crustacean related to crabs and lobsters. The sowbug loves to live in leaf litter. It has adapted its gills to breathe in wet conditions, and it flourishes in damp litter.

An insect which contributes a great deal to the soil is the springtail, which eats the droppings of wood lice. The springtail further breaks down the material into fine particles. Moreover, the springtail also adds some of its own waste products.

The person might find members of a unique group called the Enchytyracids. There are little white worms which are relatives to the earthworm. They eat the droppings of wood lice and springtails. Because they emit an alkaline secretion from salivary

BACKGROUND INFORMATION (Cont'd.)

glands, the Enchytyracids produce a very fine humus.

Because of changes brought about by animals, plants can receive nitrogen in the proper form, roots can get through the soil easier, and air and water can percolate more effectively.

The animals living in the soil are all unique, but they do have one thing in common; they all are adapted for digging through the soil.

Pocket gophers are adapted with powerful clawed hands to tear loose the earth. Their bodies then press it down and push it back to where the hind legs can pile it up. When a pile has been collected, the gopher turns around and shoves the dirt out of the hole. This action forms the gopher mounds that people see on the surface.

The skull of the gopher has thick ridges on them for the attachment of mighty jaw muscles. These are needed because gophers use their teeth much like pick axes. The lip closes neatly behind the teeth to keep the dirt out of their mouths.

The mammal that is best adapted to living underground, however, is the broad-footed mole. It may dig two hundred to three hundred feet of ridges every day. The mole is cigar-shaped and moves through the earth with little resistance, there being no outside ears to get in its way. Even the fur brushes easily front or back, allowing the mole to travel either backward or forward. When digging, the mole looks as though he/she is doing the breast stroke. The mole has very poor eyesight since his/her eyes have degenerated from their lack of use in daylight. Instead, their sense of touch and smell have become keener, which enables them to locate insects and worms. People seldom see moles because they stay underground most of the time.

The common earthworm spends 100 percent of its time crawling through the soil and eating soil. The worm is equipped with bristles that can be pushed out of the pockets in the body wall and catch hold of the soil. The front end of the worm moves forward first; then the back part of the body is drawn up, and the process is repeated.

The worm really eats its way through the soil. It scrapes food into its mouth after saliva has poured out, softening and even partly digesting it. The food and dirt pass into a storage crop and then into a tough gizzard where it is ground; and then the food goes to the intestines, where the usable nutrients are absorbed out. Indigestible contents are deposited above the ground as casts. Casts have been proven

BACKGROUND INFORMATION (Cont'd.)

to make the soil rich and are high in calcium, nitrogen, and various other minerals.

Another soil mover is the badger. It is a low, flat, powerful animal belonging to the weasel family. It has extremely long claws and long, loose fur on the back and sides. The badger relies on rodents as its main source of food and digs large holes in order to catch its prey. Since most badger diggings are next to bushes and shrubs, it is believed that the badger uses the element of surprise and ambush to catch its victims.

CURRICULUM OBJECTIVES

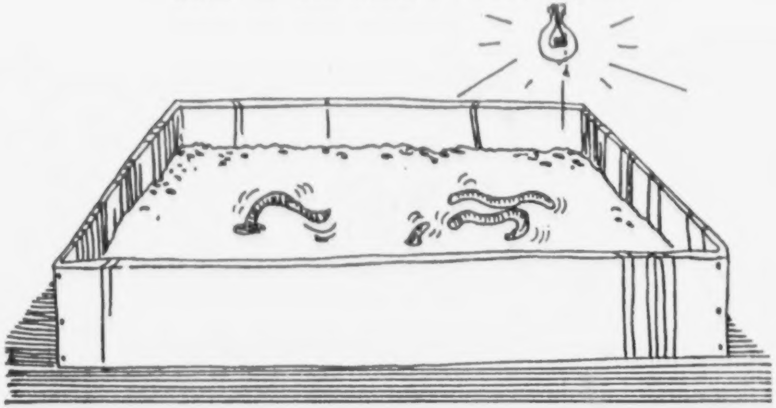
Students will be able to:

1. List the different adaptations of animals in the soil environment.
2. Explain how decomposers and some invertebrates are responsible for the production of soil.
3. Explain why plants rely so heavily on soil decomposers.

"DOING ACTIVITIES"

Students will be able to:

1. Collect leaf litter from a damp area and list the different types of animals found in the litter.
2. Dig up clover, vetch, mountain pea, Scotch broom, or any other plant from the pea family and observe the nodules on its roots formed by bacteria that "fix" nitrogen from the air. Note: The teacher will need to explain nitrogen fixing to the students.
3. Examine earthworms by placing them in a box with a wet rag at one side. Describe what happens.
4. Place earthworms in a box with a light source at one end, and note their reactions. How do the reactions referred to in #3 and #4, relate to the worm's "life style?"



CONCEPTS

1. Mountain waters support few large fish.
2. Amphibians are dependent on water.
3. Amphibians undergo metamorphosis.
4. The invertebrates are the best adapted to the water environment.
5. Water in the mountains of Southern California is a precious commodity.

BACKGROUND INFORMATION

The water environment is a very limited one in the mountains of Southern California. In some areas, the water may flow during the wet and cool months and disappear during the hot, dry months.

Since human beings have come to the region, the demands on the water system now become greater and greater. Where water once ran all year, it now only trickles during the dry months.

In the mountain waters, there are very few large fish because most need water with a high exygen content. In fast moving, well-aerated streams, there is not sufficient volume to support large fish. In slow-moving and shallow water, the oxygen content is also low, and most fish cannot survive in it.

In the backwaters of San Gabriel Canyon, the California Department of Fish and Game plants some brown Trout, but they are generally fished out during the same week in which they are planted.

Another fish that can be observed in the permanent streams is the large-scale sucker. It has adapted to living on the bottom possesses a down-pointing, sucker-like mouth.

In some lakes, minnows and mosquito fish live in the shallow areas. The mosquito fish were imported to eat mosquito larvae and have become naturalized.

Most amphibians live near permanent waters, have clammy, smooth skins which cannot stand much heat or direct sunlight and are dependent on water. All amphibians go through three stages of life called metamorphosis. First is the egg, which is laid in water; second is the larvae (called "tadpoles"); and third is the adult. The larvae usually have gills; and, as they cahnge, lungs develop in the adult stage. During mating season, the males, which are smaller in size, ride on the backs of the females. The male helps the female squeeze out the eggs. Fertilization occurs at this time.

Amphibians which live in this region include the California Newt, Western Toad, and the Pacific Tree Frog. Bullfrogs can

BACKGROUND INFORMATION (Cont'd.)

also be found, but they are becoming scarce because they are hunted for their legs, which having consider to be a delicacy. The scarcity of bullfrogs can also be attributed to lack of water and other characteristics of a favorable habitat.

The water dwellers which have survived most successfully in the slow-moving waters and shallow ponds are the invertebrates.

If a sampling of water is taken, hundreds of insects and insect larvae can be observed. By turning over rocks, a person can also find hellgrammites, dragonfly nymphs, and caddisfly nymphs, which make homes that look like nets. In quiet areas, there are water boatman, diving beetles, and water striders.

Under some rocks, little flatworms, planaria, glide away when exposed, trying to escape from the light. The little worms have great powers of regeneration. They are fascinating laboratory specimens as they grow new heads and tails when cut into pieces.

Areas near a stream or pond are thick with algae and support great populations of snails. Both sexes are in one individual (hermaphroditic) and are prolific reproducers.

In the mountains near Los Angeles, water is very precious. It should be preserved at all cost. Think how important water is to the aquatic life that depends on it. Any slight alteration can drastically change or destroy an ecosystem.

CURRICULUM OBJECTIVES

Students will be able to:

1. List some of the fish that live in the mountain waters.
2. List some amphibians that can be found in the mountain waters.
3. List the three metamorphic stages of an amphibian.
4. List some of the invertebrates that can be found in the water.
5. Discuss why water is such an important commodity in the mountains of Southern California.

"DOING ACTIVITIES"

Students will be able to:

1. Make a collection of:
   a. Fish
   b. Amphibians
   c. Invertebrates

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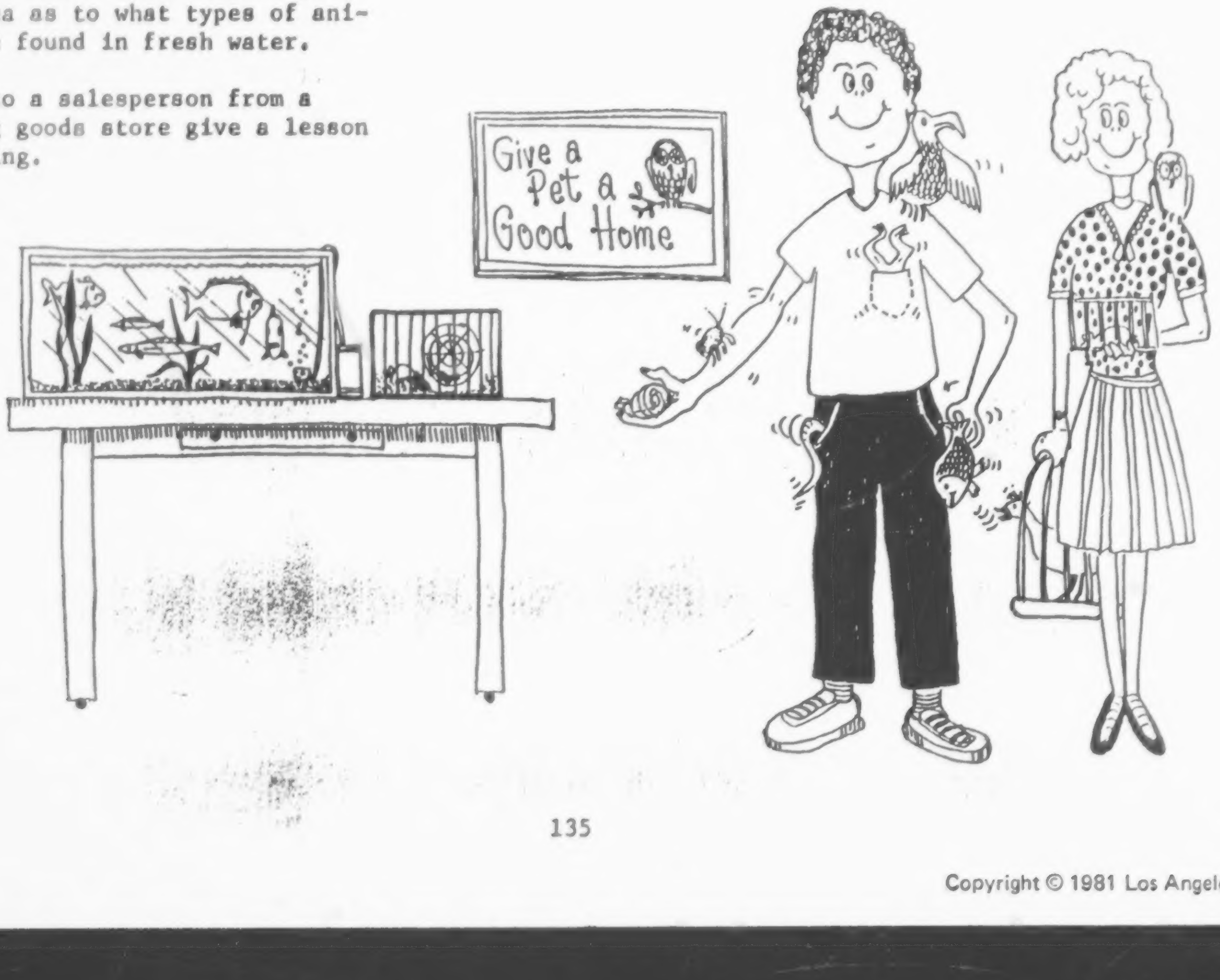
"DOING ACTIVITIES" (Cont'd.)

These animals can be observed and studied. Differences can be noted. Discuss the evolutionary aspects of the water animals. Students might classify them from the more simple to most complex.

2. View films that concern the aquatic habitat. These will help to give some idea as to what types of animals are found in fresh water.

3. Listen to a salesperson from a sporting goods store give a lesson on fishing.


Give a Pet a Good Home

CONCEPTS

1. The mammals are the most difficult animal group to study because they stay hidden during the day.

2. Bats have adapted to fit their environment with their unique "radar" system.

3. The oppossum is a marsupial that "plays possum."

4. Squirrels have adapted to their particular niche.

5. The largest mammals usually found in the mountains are the deer.

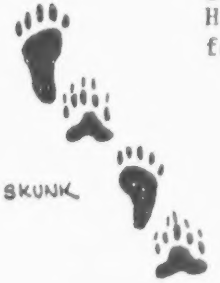
BACKGROUND INFORMATION

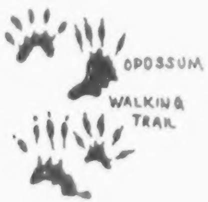
Mammals are animals that are usually covered with hair (fur) and which give milk to their young. Mammals are the most difficult group to study because they stay hidden during the day and try to avoid people. The best way to study them is to set up a feeding blind and observe them at dusk, at night, or in the early morning. Remember to approach wild animals with caution and move slowly. Dark colored clothes should be worn.

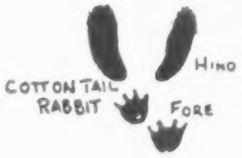
Because of the noise accompanying a group of backpackers, animals are usually warned far in advance of their approach and take shelter before the hikers arrive.

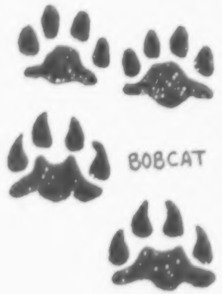
One way to study animals as you hike is to look for animal droppings or scat. The differences in their abundance give an indication of the types of animals in the area and their population. Homes of animals can also be observed along the trail.

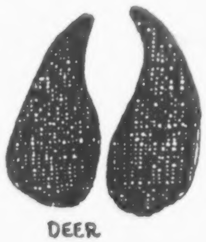
Another method of looking for evidence of animals is to observe animal tracks. A good place to observe tracks is near water. Here are a few examples of tracks to look for:











BACKGROUND INFORMATION (Cont'd.)

All mammals have adapted to their environment. Many of the adaptations already have been mentioned in other sections. One mammal which has not been discussed elsewhere is the bat, which has a remarkable "radar" system. This system allows it to fly in darkness and catch insects in the air while avoiding such obstacles as twigs and branches. Each bat makes a high-pitched squeak too high for our ears to hear. These noises echo from objects through dense foliage.

Bats are often feared, but most are insectivores and beneficial animals. They eat tons of harmful insects every year.

One of the most common mammals is the opossum. It is a marsupial, and the babies are carried in the pouch until they are fairly large. Opossums can be seen on the flood plain and in the stream-side environment. They are omnivores and eat eggs, fruit, nuts, and garbage.

If an opossum is cornered, it usually "plays possum," faking death. When the danger is past, he/she "revives" and goes about his/her business.

An animal that might be seen moving from one bush to another is the Brush Rabbit. It looks like a cottontail and comes out of it borrow for short periods to feed on the vegetation. It is extremely shy and therefore is rarely seen or identified.

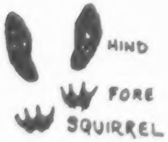
Other animals that may be seen during the day are ground squirrels and tree squirrels.

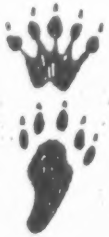
The ground squirrel rarely climbs trees, but climbs fenceposts and sits in bushes. Ground squirrels have adapted to their environment by estivating during the hot months. Estivating is taking a prolonged sleep, which enables the ground squirrels to conserve body resources. As the weather cools, the ground squirrel populations reappears.

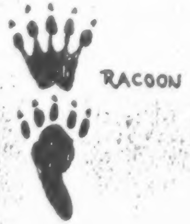
The gray squirrel is a graceful leaper and can be seen scampering from branch to branch, living mostly in the tree tops. To carry on the acrobatics, this squirrel has a well-developed, bushy tail that acts as a balance. His/her eyes also have evolved to a more forward position for better depth perception.

Mule deer are the largest mammals seen in the mountains near Los Angeles. They are in the timber areas as well as the chaparral. Most of the deer are overlooked by hikers because they stand very still or slink through the vegetation, blending with its coloring.

After cooking, hikers should bury food scraps far from the campsite. If not, they







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BACKGROUND INFORMATION (Cont'd.)

have invited the racoons to visit. They are notorious scavengers and can be noisy in the middle of the night when the campers are trying to sleep.

CURRICULUM OBJECTIVES

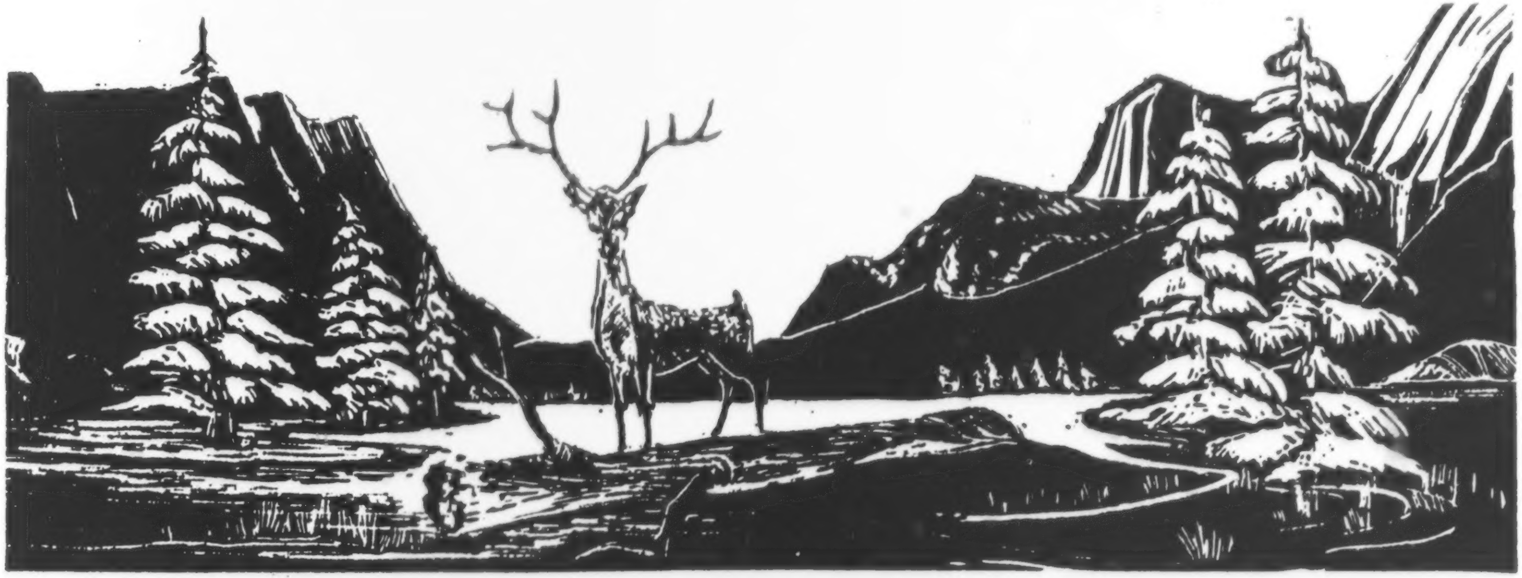
Students will be able to:

1. Demonstrate ways that animals might be observed in the mountains.
2. Discuss how the bat's "radar" system works.
3. List ways in which the squirrels have adapted to the environment.
4. Make a list of animals that might be seen during day or evening and where they might be observed.

"DOING ACTIVITIES"

Students will be able to:

1. Set up a blind near a watering hole and observe the animals that use it during the night. The footprints can be examined in the morning.
2. Set out live traps and catch small mammals for observation. Students should be careful not to harm the animals. After studying the animals, they should be returned quickly to the area in which they were caught.



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CONCEPTS

1. Rodents compete with the food supply of humans.
2. Predator and prey relationships are built-in natural population controls
3. All predators have adaptations that help them hunt effectively.
4. Pit vipers use special sense receptors when hunting.
5. Small prey have their own built-in protection mechanisms.
6. Human beings have upset the balance of nature in many areas of our natural environment.

BACKGROUND INFORMATION

A system has evolved in nature in which living things interrealte and prosper. During their daily routines, living things hold each other's numbers in check. Plants are kept in check by plant-eating animals, and plant-eating animals are controlled by meat-eating animals.

In a given area, there are always more plant eaters than meat eaters. It takes more to feed a meat eater; therefore, meat eaters need a larger hunting area. Consequently, they are fewer in numbers.

Rodents compete for the food supply of humans. Some move into the homes of humans. Rodents are bad housekeepers. The fleas which some carry are responsible for plaque. Damage done to crops is counted in millions of dollars. They can infest orchards and destroy crops, often storing more food than they can use.

A family hatch of rodents is usually five offspring, but it can number 11. A female can produce five to 10 litters a year. The young then begin producing litters when they are only four weeks old. With a reproduction rate like this, rodents could quickly cover much of the Earth's surface. But predators come to the rescue.

Hawks are extremely well equipped for hunting. They have a combination of keen eyesight, fast reactions, perfect flight control, expert timing, and precision in spot location.

Owls, too, are great rodent controllers. With their keen sense of hearing and keen eyesight, they are important in the war against the rodents.

It might seem that the small animals are at a disadvantage. The coyote, for example, is a well-adapted rodent catcher. It has speed, long limbs, and sharp teeth. The rabbit, in contrast, is not as smart and seems to have very few defenses. The odds look uneven, but natural adaptive charac-

BACKGROUND INFORMATION (Cont'd.)

teristics even the odds. The rabbit has big, round eyes set far on the sides to give it almost a 360-degree field of vision. Built into the spine and hind legs is a "catapult machine," triggered for a split-second response by large nerves and muscle. When a rabbit travels, it moves back and forth, dodging in an unexpected way. The odds favor the rabbit's get away on many occasions.

Predators have larger brains than their prey and have adapted teamwork in successful hunting. Also, their childhoods are long and allow time to develop brain and muscles while their parents teach them hunting skills.

Nature handles overpopulation by pushing the "extras" into unfavorable places. Without proper shelter and food, the animal is usually caught or dies of starvation. With some animals, there is an increase in numbers; and, at the same time, an increase in the numbers of predators.

Claiming a certain territory, as some birds do, may also be a population controller. Those unable to secure nesting and feeding space cannot raise families. Some animals use noise-making, massed flight, and scents as controls. Within an animals, some type of chemical change may occur. This interrupts the growth and reproduction cycle.

Although the balance that nature has achieved in predator-and-prey relationships has built-in controls, impact of humans has changed much of that balance. In some instances, all the large predators have been killed. If the deer population increases, there is not enough vegetation. Then the numbers of deer drop because of starvation.

One of the saddest cases of mismanagement of animals has occurred in California. It is ironic that the grizzly bear appears on the state flag, and yet the only place you can find grizzlies is in the zoo. Humans have destroyed all of the grizzlies that once roamed the mountains.

Snakes are also important hunters. Many snakes enter rodent burrows while others hunt in the field. Some snakes hunt by day, and others hunt by night. Since their eyesight is limited, they locate their prey mainly by smell. In addition to the receptors in its nose, the snake flicks its tongue out to bring additional odor particles into its mouth. On the roof of the mouth are two small hollows where the nerves receive the stimuli and carry the impulses to the brain. Some snakes even have holes in their lips, making an easier passage way for the tongue.

Pit vipers live in the mountains of Southern California. They are the Western Diamondback Rattlesnake and the Red Diamondback. Equipped with rattles, they gener-

BACKGROUND INFORMATION (Cont'd.)

ally make their presence known before striking. Rattlesnakes are venomous, but their bites are not fatal if the victim remains calm and has proper treatment. Sometimes, a rattler does not even inject poison into the skin because the angle of attack was wrong. The amount of venom injected varies from bite to bite. If the snake has hung onto the skin with its fangs, more venom is injected. How long ago the snake has had food also makes a difference. If the snake has just eaten, then it has already used some of its venom, and the amount of poison injected is not as great as it would be if the snake had not eaten in two weeks.

Bobcats are great rodent hunters. They have been known to kill deer, but they usually prey on smaller animals. Members of the cat family, bobcats are not built for a chase but for lying in ambush. Their legs are not enough for a long chase, and their lungs are not built for endurance. The bobcat moves as close as possible to its game, covers the remaining distance with a burst of speed, and springs with claws out.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize the importance of keeping the rodent population under control.
2. Be aware of some of the advantages that predators have over their prey.
3. Be aware of some advantages that the prey have over predators.
4. Explain how pit vipers find and catch their prey.
5. Recognize some of the ways in which human beings have upset the balance of nature.

"DOING ACTIVITIES"

Students will be able to:

1. Simulate a predator-prey relationship by using macaroni, silverware (knife, fork), and straw. The object is to get as much macaroni of different shapes as possible and to scatter it in a designated area. Students then send the predators (knife, fork, straw) out to see which predators return with which prey. Students then record the findings and determine whether there is any correlation between the type of utensil used and the type of macaroni picked up. A variation can be made by dyeing the macaroni brown, black, and green. Decide whether camouflaging has any effect.

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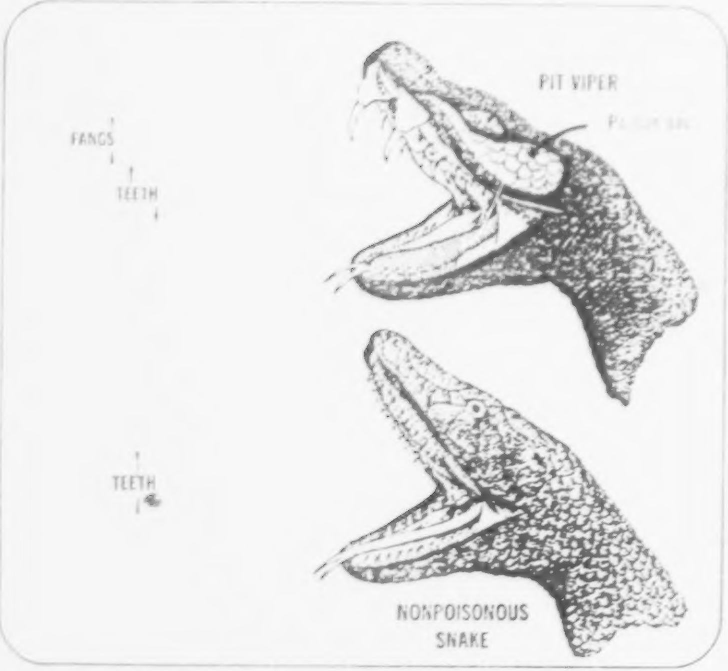
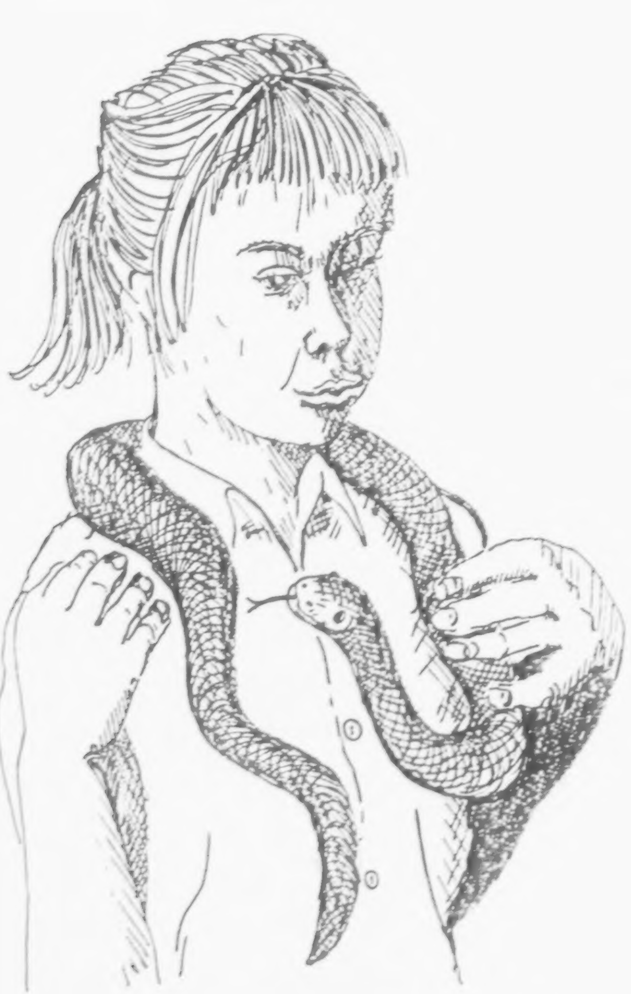
"DOING ACTIVITIES" (Cont'd.)

2. Handle a snake. Observe a snake feeding on a rodent and see how it unhinges its jaw to accommodate the size of the meal.

3. View films in the classroom relating to the food web and predator-prey relationships.


PIT VIPER
POISON SAC
FANGS
TEETH
TEETH
NONPOISONOUS SNAKE



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CONCEPTS

1. Most plants are stationary, self-feeding organisms. They continually grow during the course of their lives and secrete cellulose around their cells, providing a relatively rigid support system.
2. Photosynthesis is a process unique to plants whereby sunlight reacts with the pigment cholorphyll to produce food.
3. Green plants take the food they produce and combine it with mineral compounds of the soil. From these raw materials, they produce all the complex compounds in their bodies.
4. The roots, stems, leaves, and flowers (or cones) of the plant are structured to perform specific functions required for plant growth and reproduction.

BACKGROUND INFORMATION

Four characteristics distinguish most plants from most animals. These "life-style" characteristics are:

1. Plants are stationary.
2. Plants are able to produce their own food from raw materials in the air and soil through the action of a green pigment, chlorophyll.
3. Plants grow continually throughout the course of their lives.
4. Plants secrete cellulose around their cells, this provides them with a fairly rigid support system.

Sixteen elements are considered essential for normal plant growth. Three of these (carbon, hydrogen, and oxygen) make up approximately 92 percent of plant weight and are obtained chiefly from the air (carbon dioxide--CO_2) and water (H_2O). The remaining 13 elements are taken from the soil. These soil elements are absorbed and dissolved in water available at their root base. Using the sun's energy, these elements combine through photosynthesis to produce various foods and other organic substances that allow growth and reproduction. Nitrates (NO_3) are the most important of all mineral compounds. They make possible the production of protein.

The bodies of plants are made up of four basic parts: roots, stems, leaves, and flowers (or cones). The roots, stems and leaves are the vegetative parts of the plants. The roots are concerned with the absorption of water and dissolved minerals. Roots also anchor the plant and in some species are concerned with reproduction. Stems support the leaves and flowers or cones and participate in the photosynthetic process. Both stems and roots store food and water.

BACKGROUND INFORMATION (Cont'd.)

Leaves are attached to the stem. Their main function is the manufacture of foods through photosynthesis. The common leaf is made up of a stalk (petiole) and a flattened blade.

Flowers and cones are the reproductive parts of plants. Through their specialized organs (stamens, pistils, etc.), they produce seeds. Flowers and cones also store considerable amounts of complex foods during their cycle of reproduction.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify four basic characteristics common to most plant life.
2. Describe the functions of the four basic parts of the common plant body (root, stem, leaf, and flower or cone).
3. List the basic raw materials needed for all plant growth: carbon dioxide (CO_2), water (H_2O), and soil nutrients, the most important of which is nitrate (NO_3).

"DOING ACTIVITIES"

Students will be able to:

1. Find a plant and "befriend" it through a 10- to 15-minute study. Make a presentation to the group, decribing the plant's basic parts and two of its unique characteristics.
2. In a drawing or collage, illustrate the four "life-style" characteristics common to all plants.
3. Using plastic, wire, paper or any other available material, create their own plants to meet the requirements of one of the following habitats:
   a. A dark understory beneath dense trees.
   b. An exposed, hot and dry hillside.
   c. A mucky streambottom.
   d. A thin, rocky soil exposed to all elements of weather.

   The plant that the students create should include all necessary characteristics of common plants as well as any special adaptive features needed for their habitats.
4. Draw a diagram of the nutritional cycle of plants. Include the sources of key materials and show how they are used. This diagram should include at least CO_2, H_2O, NO_3, and sunlight.
5. Study the wood characteristics of any two trees or shrubs. Make a list of similarities and differences purely through observation.

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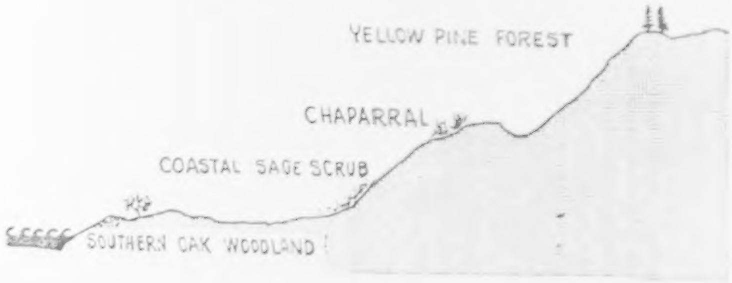
CONCEPTS

1. A plant community consists of a naturally occurring group of plants with mutual relationships.

2. Usually, there are certain plants so common and unique to a plant community that they serve as "indicators" of that community.

3. Factors determining a plant community include soil depth, soil type, extent of exposure to sun, angle of slope, elevation, and available moisture.

4. The four dry-land (non-riparian) plant communities of our "city side" of the mountains can be found in the approximate locations shown in the diagram below.



5. A plant community is a mental concept of humans and, therefore, often does not completely conform with the real environment; it is a term of convenience.

BACKGROUND INFORMATION

Plants with similar requirements for such things as soil type and exposure to sunlight are often found growing together in what people have termed "plant communities." Usually, a plant community will have one or more dominant plants, and some communities are named after these dominant species. For example, the Southern Oak Woodland takes its name from the plant the Coast Live Oak. Such dominant plants serve as "indicators" for that community.

A combination of factors, including soil depth and type, elevation, angle of slope, extent of exposure to sun, and moisture content determine the types of plants found in any area.

The slopes of the San Gabriels facing Los Angeles are characterized by five communities:

1. Southern Oak Woodland. This community occupies the inland valleys, along with the cooler and damper north-facing slopes. The community occurs at elevations ranging from 300 to 5000 feet above sea level.

BACKGROUND INFORMATION (Cont'd.)

It is characterized by scattered trees with an undergrowth of grasses, other herbaceous plants, and low shrubs. As its name suggests, the community is dominated by the various evergreen oaks.

2. Coastal Sage Scrub. Dry, rocky slopes below 3,000 feet are the locations of this community. Usually, it is found on the coastward side of slopes in a region which has a hot, dry climate. The dominant species are Coastal Sagebrush, White Sage, and Black Sage.

3. Chaparral. This community is typical of dry, sunny, steep slopes which face south and west and have elevations of from 1,000 to 5,000 feet. Chaparral is usually dominated by Greasewood, Laurel **Sumac**, Scrub Oak, and various species of Mt. Lilac (Ceanothus).

4. Yellow Pine Forest. This community grows in Southern California at elevations from 5000 to 8000 feet. Its lower reaches touch the Chaparral. Two closely related pines, Ponderosa and Jeffrey, dominate the vast, park-like Yellow Pine forests in the high mountains. At about 8000 feet, the Yellow Pines give way to Red Fir.

5. Riparian. Along any watercourse, even if the water does not run all year, there are changes in several environmental factors. These changes allow the development of a very different community than that of the surrounding hillsides. This Riparian (streamside) community is a product of greater soil moisture, increased humidity, and cooler air temperatures. The dominant riparian plants are water-loving trees, such as Big-Leaf Maple, Red Alder, Willow, and various herbaceous species, such as Mulefat, Mugwort, and Snowberry. The shade produced by the large trees further increases the humidity and coolness of the community.

Since the characteristics of plant communities have been identified by people, they are not always applicable to an actual environment. There is no clear demarcation between the end of one community and the beginning of another. But the concept of a community is helpful in studying and classifying plant species and in describing the general environment of an area.

Whenever humans disturb a natural community, they commonly introduce non-native species of plants or develop short-lived herbaceous plants that dominate the area. The most "pure" communities are those that develop away from the influence of humans.

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CURRICULUM OBJECTIVES

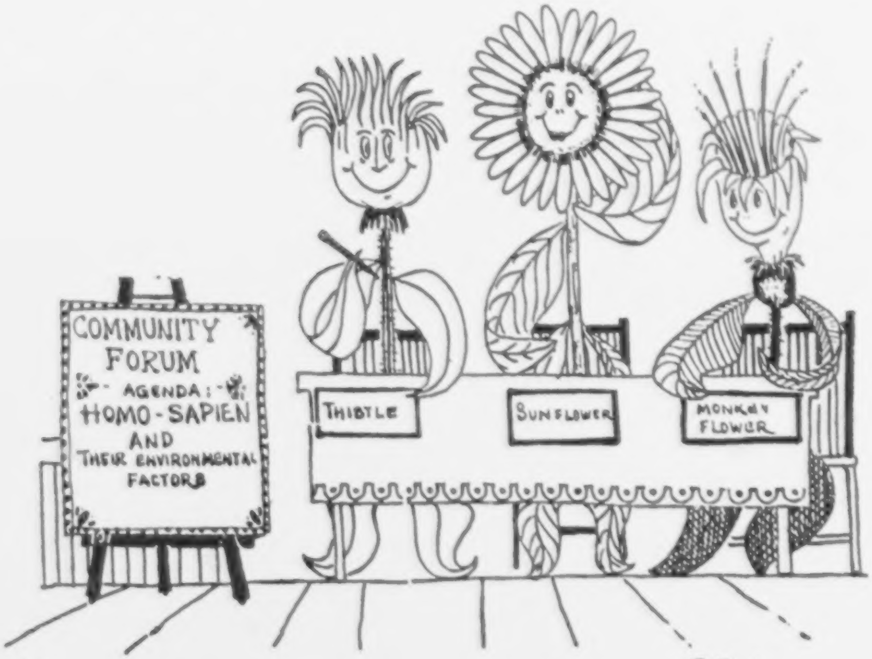
Students will be able to:

1. Define the term "plant community."
2. List the five plant communities most commonly found while hiking in the San Gabriel Mountains.
3. Identify three factors that cause the variety of plant communities.
4. Recognize the difficulty in finding a perfect example of any plant community.
5. Explain why the term "plant community" can never properly apply to an area continually disturbed by humans.

"DOING ACTIVITIES"

Students will be able to:

1. "Stake out" an imaginary area and study it to decide whether or not they wish to characterize it as a single plant community. Each student must then defend his/her decisions to other class members.
2. On a hike, study the plant communities observed and their characteristics. In a written or oral report, students may describe what physical and topographical changes were noted in relation to other plant communities.
3. Choose one of the five plant communities common to the San Gabriels and, by consulting references, list six plant species that are found in it.
4. Select a canyon for study, and observe how far up the trees have been able to grow on each side. What does this indicate about these trees and the canyon conditions?
5. Examine an area for signs of human disturbance. Describe how this area differs from a more remote, undisturbed site. What differences are observable in the plant communities of the two areas?


COMMUNITY FORUM
AGENDA: HOMO-SAPIEN AND THEIR ENVIRONMENTAL FACTORS
THISTLE
SUNFLOWER
MONKEY FLOWER

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CONCEPTS

1. Plant size and general appearance are unreliable characteristics in the identification of plants.
2. Plants are commonly divided into three major groups: herbs, shrubs, and trees.
3. Plants have two names: scientific (genus and species) and common.
4. All vegetative parts of a plant may be modified by the environment; but the plant's flower or cone is least susceptible to modification and, therefore, is the most reliable determiner of classification.
5. Humans have introduced many alien (non-native) plants into the Southern California mountains, and several of these have become hard to control.

BACKGROUND INFORMATION

To identify plants, a knowledge of their specific characteristics is required. The size of a plant and its general appearance are not definitive enough to serve as a key for identification.

Guides to plant identification are easy to use once students are able to note common distinguishing features. Common practice and most simple guides divide plants into three groups: herbs, shrubs and trees. Herbs are plants with soft, green stems. They have little or no woody tissue and are usually short-lived. Shrubs and trees have woody stems. Such stems are thick and hard. The main stem or trunk of a tree rises some distance above the ground before branching. Shrubs are not necessarily smaller in height than trees. Their distinguishing characteristic is the presence of several woody stems, about equal in size, that rise at or close to ground level. It is difficult to determine whether some plants should be identified as being a tree or a shrub.

Every plant has two names--a scientific name, consisting of a genus and a species name; and a common name. For example, a plant abundant in the San Gabriel mountain chaparral is commonly known as greasewood; its genus name is Adenostema; its species name is fasciculatum. Therefore, its scientific name is Adenostema fasciculatum. It is proper to underline a scientific name.

To identify a plant, it is often useful to consider specific vegetative characteristics, such as the following:

- Leaf arrangement on the stem.
- Shape of the leaf.
- Appearance of bark.
- General shape of plant.

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BACKGROUND INFORMATION (Cont'd.)

However, these types of characteristics are extremely limited in the identification of individual species. The reproductive parts and processes are the key features for identification since they are less influenced by the environment and and display a resemblance to characteristics in related species.

Plants are also identified by whether or not they are native or alien (introduced by humans). Several alien species, such as Scotchbroom, Castorbean and Tree Tobacco, were brought to the San Gabriel Mountains years ago. They adapted so successfully to their new environment that they now threaten native species since in certain areas they have competed more effectively than have most natives for the essential resources.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe what is meant by the terms herbs, shrubs, and trees.
2. Identify the most commonly used characteristics for plant identification.
3. Distinguish between a plant's scientific name and its common name.
4. Identify the dominant trees in exposed mountain slopes as broad-leaved evergreens and the dominant trees on protected slopes at higher elevations as needle and scale-leaved trees.
5. Identify two San Gabriel Mountain plants that were introduced by humans.

"DOING ACTIVITIES"

Students will be able to:

1. In any area of study, point out a plant considered typical of the categories herb, shrub, and tree.
2. Given three leaves at random, point out three distinct differences that might be used to classify them.
3. Given a "Pacific Coast Tree Finder" and minimal instruction on its use, "key out" two dominant trees in the area of study.
4. Collect leaf samples from a deciduous tree and an evergreen tree; make a list of the differing characteristics of these two trees.
5. In an area that is dominated by some alien plant, attempt to determine the effect of this non-native plant on the surrounding native vegetation.

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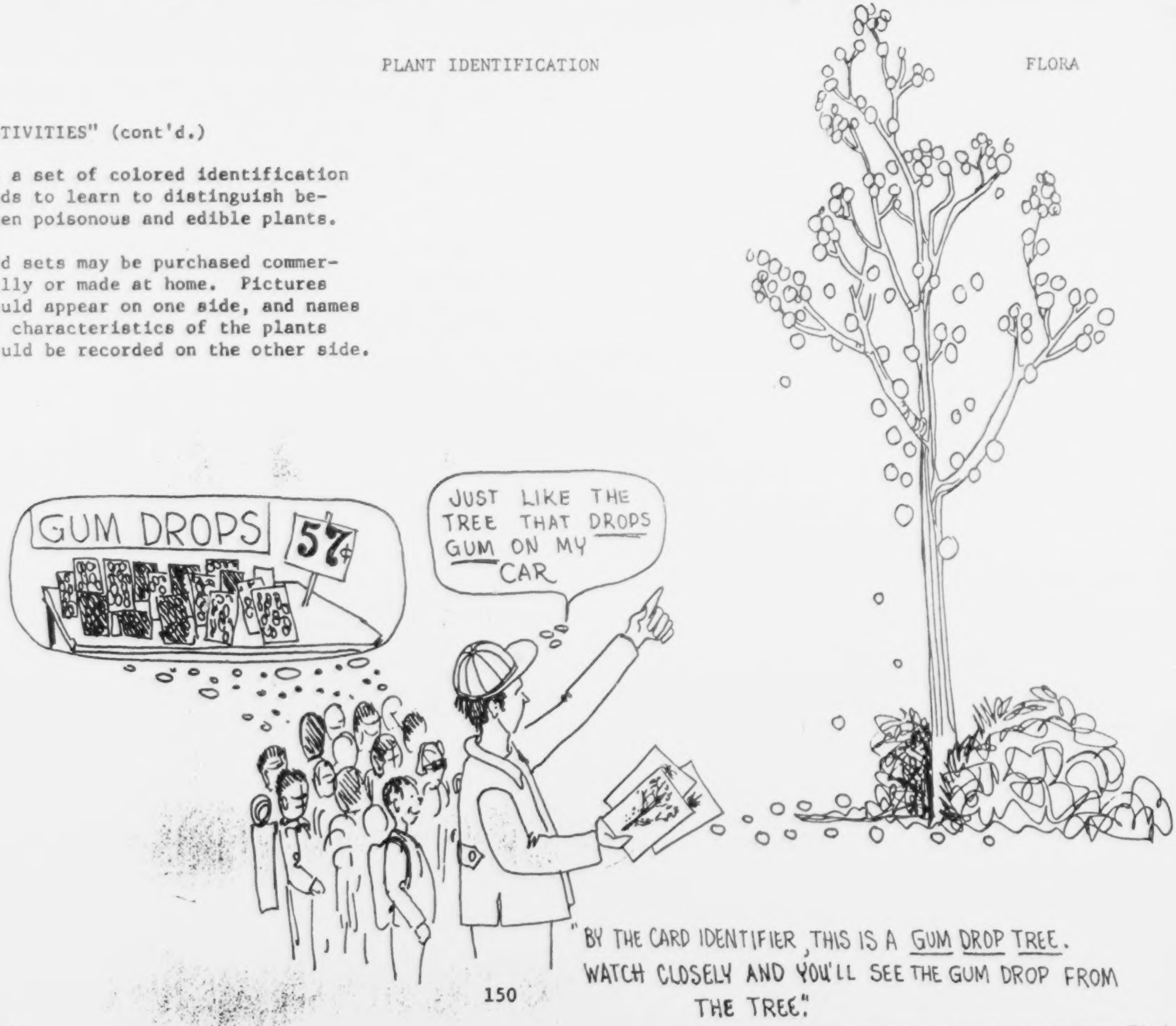
"DOING ACTIVITIES" (cont'd.)

6. Use a set of colored identification cards to learn to distinguish between poisonous and edible plants.

   Card sets may be purchased commercially or made at home. Pictures should appear on one side, and names and characteristics of the plants should be recorded on the other side.


GUM DROPS
57¢
JUST LIKE THE TREE THAT DROPS GUM ON MY CAR

"BY THE CARD IDENTIFIER, THIS IS A GUM DROP TREE. WATCH CLOSELY AND YOU'LL SEE THE GUM DROP FROM THE TREE."

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CONCEPTS

1. All plants, when not aided by humans, live where they do because of adaptations that allow them to "make a living" successfully in that environment.
2. The plants in the mountains have had to evolve specific ways of dealing with recurring fires.
3. The majority of plants in the mountains are xerophytes (plants adapted to dry conditions).
4. Most mountain plants have adapted to thin, poor soils.

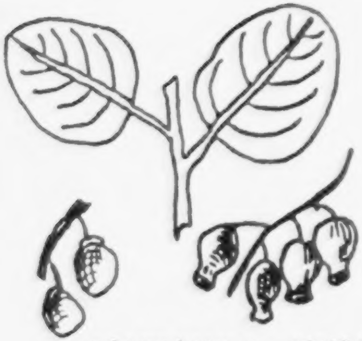
BACKGROUND INFORMATION

All plants that have developed in a particular habitat without the aid of humans have adapted to that habitat. Through adaptations, plants are able to live in surroundings that offer less ideal conditions.

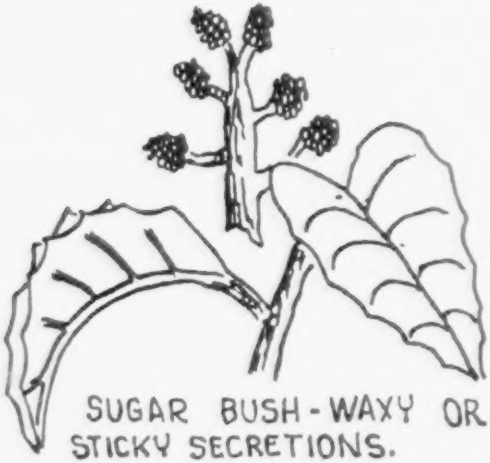
The San Gabriel Mountains present a harsh environment to most plant life because of their high solar exposure, rocky soil, and the limited availability of water. These plants have developed unique characteristics that enable them to survive in these conditions. Such plants are known as xerophytes. This type of plant life is usually characterized by deep root systems and the accumulation of duff (undecomposed plant litter). The deep root systems help the plants to tap water far down in the soil and provide the plants with secure anchors. The accumulated duff increases the ability of the soil to absorb water.

Common leaf and stem adaptations that reduce water loss include:

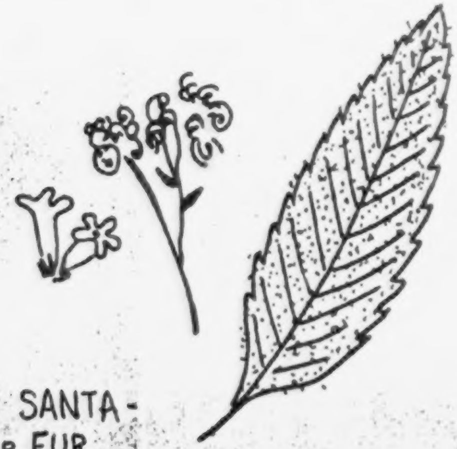
1. Thick, stiff structure (minimizes mechanical injury during wilting: helps resist desiccation).
2. Waxy or sticky secretions (reduces evaporation).
3. Hair or fur covering (reduces evaporation by producing "dead air" space).
4. Whitish coloration (reflects much solar energy).
5. Cupped, curled, or folded leaves (reduces solar exposure).
6. Dense, brittle branching causing thicket growth (increases shading, reduces exposure, and creates dead air space).
7. Leaf growth approximately parallel to the sun's rays; e.g., laurel sumac and manzanita (reduces solar exposure).



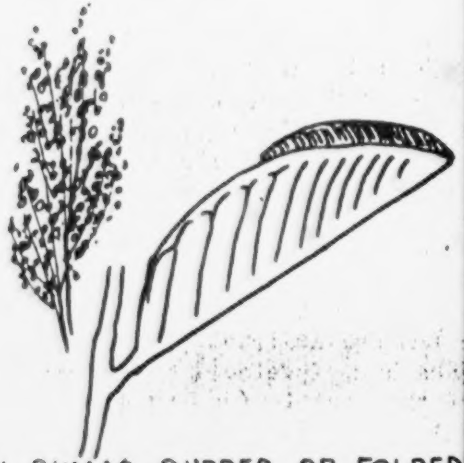
MANZANITA - THICK AND STIFF STRUCTURE.



SUGAR BUSH - WAXY OR STICKY SECRETIONS.



YERBA SANTA - HAIR OR FUR COVERING, REDUCES EVAPORATION BY PRODUCING "DEAD AIR" SPACE.



LAUREL SUMAC - CUPPED, OR FOLDED LEAVES REDUCES SOLAR EXPOSURE.

BACKGROUND INFORMATION (cont'd.)

Fire is yet another factor to which the plant life has been forced to adapt. Basic plant adaptations to fire include:

1. Fire-triggered seed germination.
2. Root crown sprouting of certain species a result of large root food reserves and the maintenance of root meristems (growth tissues).

The flowering plants of the San Gabriels commonly produce either small, short-lived flowers or large, showy, longer-lived flowers. The short-lived flowers assure plant reproduction by their very abundance; the longer-lived flowers attract bees and insects by their size and bright colors. Each type has developed a method that is effective in reproducing its species.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe some of the common adaptations of plants in the San Gabriel Mountains to sparse rainfall and soil water.
2. Identify common leaf and stem adaptations to reduce water loss.
3. Explain two ways in which local mountain plants have adapted to recurring fires.
4. Describe the two main types of flowers commonly seen in the mountains. Explain how the flowers are effective in reproducing the species.
5. Explain why both cone-bearing trees and the common shrubs of the San Gabriels grow well in thin, rocky soils.

"DOING ACTIVITIES"

Students will be able to:

1. Find examples of leaves with the following characteristics and explain how each might help the plant conserve water:
    - A whitish leaf.
    - A thick, brittle leaf.
    - A waxy leaf.
    - A leaf with hair or fur.
    - A curled, cupped or folded leaf.
2. Study the way in which plants in the San Gabriels have adapted to the presence of fire and the absence of water.

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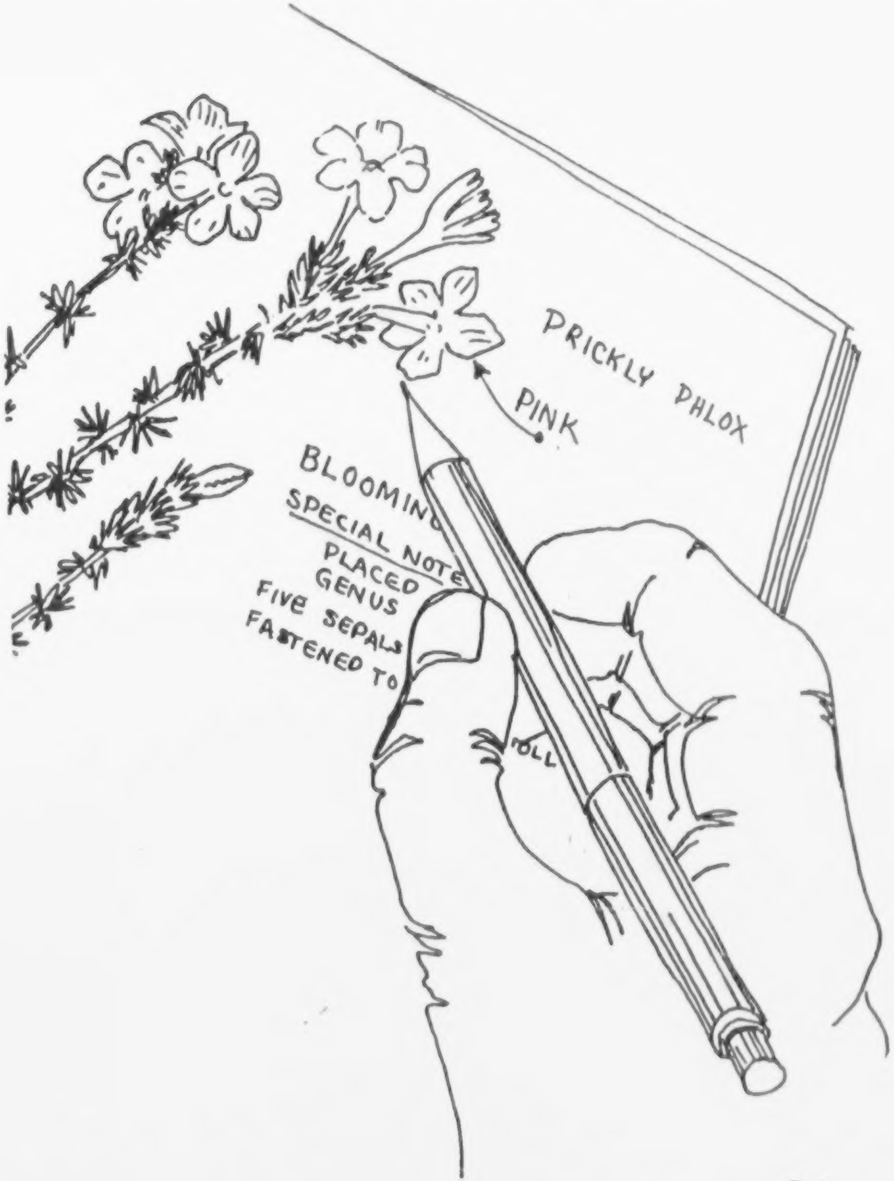
"DOING ACTIVITIES" (Cont'd.)

3. On a hike during spring or early summer, examine the various flowers in bloom. What immediate characteristics are observed? Students may draw pictures or write notes about their observations. What similarities or dissimilarities in quantity, color, and size of flower are there among the species observed? Is any color predominant?

4. Place branches pruned from different shrubs in the area of study in jars filled with equal amounts of water. Leave the jars in the bright sunlight for several hours. Did all the plants tested lose equal amounts of water? Evaluate reasons for the results.

5. Construct an imaginary plant, using any available materials (i.e., wire, paper, plastic). Have these plants met the requirements set by the environment?



CONCEPTS

1. The type and number of plant species that grow in an area are determined by biotic, soil, topographical, and climatic factors.

2. A plant's growth and size are most dependent on the absorption of water and minerals in the soil.

3. A south- or west-facing slopes receives more radiation and near-surface heating than does a north- or east-facing slope.

4. Plants growing on exposed, dry slopes have adapted to a lack of water and to an abundance of sunshine.

5. Certain mountain areas are constantly windy because of topographical and/or climatic conditions; therefore, plant growth is overly affected.

BACKGROUND INFORMATION

The types of plants and their distribution in a given area are determined by a combination of biotic (influences from living organisms), soil, topographical, and climate factors. For every plant species, there is an optimal combination of these factors that provide for abundant growth and healthy plants. Not every area in nature provides such a habitat. As a result, plants in some areas will be stunted or strangely shaped by pressures from their environment.

A major factor affecting all plants is the plant's ability to obtain water and minerals from the soil. If the soil is unusually hard or very sandy, the plant will spend most of its energy developing root systems in search of a water supply. The plant's size and leaf abundance will be diminished accordingly.

Plants of the same species occupying a dry habitat will often be widely scattered. This wide spacing is an adaptation that permits each plant enough area to develop the extensive root system it needs for a sufficient water supply. For example, some plants (such as Manzanita and Greasewood) are able to poison the soil around them so that no seedlings of another plant (even of its own species) are able to survive in the vicinity. As a result, such plants are usually widely and evenly spaced.

A plant's location equally affects its growth pattern. Too much sun dries up the water which plants need and so reduces their growth. To much shade prevents enough sunlight from reaching the plants and so hinders their photosynthetic process. South- and west-facing slopes receive more sunlight and near surface heating than do north- or east-facing slopes. Plants can live on exposed south slopes

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BACKGROUND INFORMATION (Cont'd.)

with small leaves (to cut water loss) and deep roots (to gain maximun water absorption). Conversely, plants that live on the north-facing slopes in the shade of live oaks need large leaves (to receive maximun sunlight) and require only a moderate root structure.

Plants and trees that grow in windy locales will be affected by the constant force of the wind. This is particularly visible on trees that grow on exposed, windy ridges. If the wind blows steadily from one direction, the trees will bend before the wind, and the side facing the wind will be stunted and flattened. Trees that are not sufficiently resilient will be snapped and broken by the wind.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain how the dryness of the mountains affects the spacing of plants.
2. Point out examples of spacing and differences in density among plants of the same species.
3. Recognize the effects of soil, water, and wind exposure on plant size and shape.
4. Describe how the radiation received on south- and west-facing slopes affects plant growth.

"DOING ACTIVITIES"

Students will be able to:

1. Take the temperatures of exposed slopes facing north, east, south, and west at ground level and at one and one-half meters above the ground. In a written or oral report, explain the reasons for the differences and how these would affect plant growth.
2. Select two locations in the area that seem to be alike in all ways except in their exposure to wind. Note differences in common species with regard to size of plant, density of individual plant growth, and any other significant characteristic.
3. Stack the leaves of two or more species of broad-leaved trees into piles of 10. From these piles, determine their individual thickness. Perform this measurement with leaves from plants with various exposures and access to water. Are there any obvious correlations? Does this exercise tell anything about adaptations of various individual species?

CONCEPTS

1. The basic ingredients of weather are heat, wind, and water.
2. Air that stays over an area of the Earth for a prolonged time takes on the characteristics of that area.
3. Four types of air masses affect humans. Their names are based on their origins.
   - Maritime Polar - Moist and cool.
   - Continental Polar - Dry and cold.
   - Maritime Tropical - Moist and warm.
   - Continental Tropical - Dry and hot.
4. The sun provides the energy that powers the water cycle.
5. The stages of the water cycle are:
   - Evaporation
   - Condensation
   - Precipitation
   - Surface runoff
   - Infiltration
   - Percolation
   - Transpiration

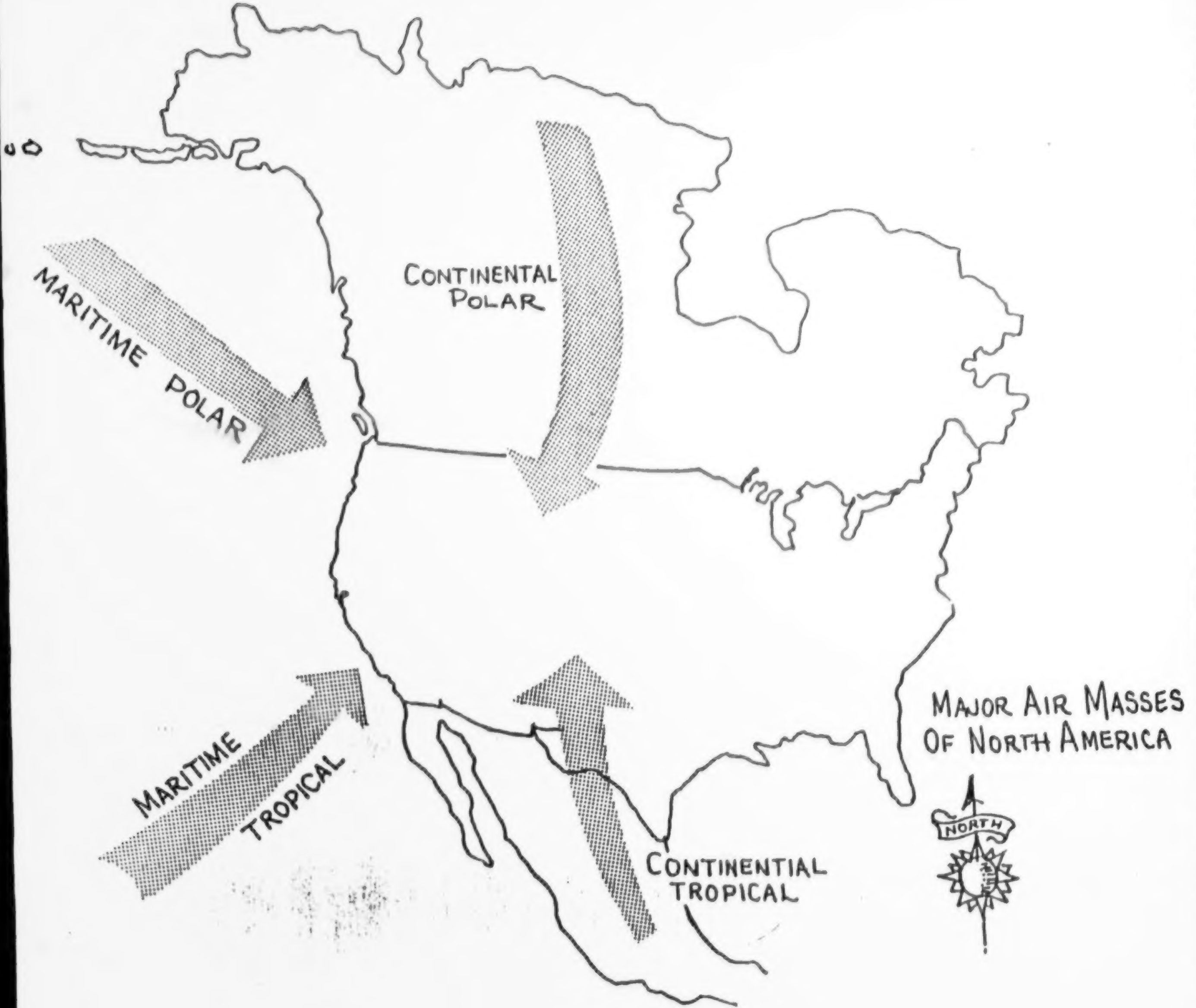
BACKGROUND INFORMATION

Weather is the state of the atmosphere at any point in time. It has three basic ingredients: heat, wind, and water. A person might view global weather as a gigantic engine with sun, earth, and atmosphere as its cooperative parts.

The driving force of the entire system is the sun, the engine's power plant. Because the Earth is a sphere, the sun's energy falls unequally on different parts of it. Insolation (incoming solar radiation) is most direct at the equator, causing great heating of the atmosphere. At the poles, the angle of insolation is very low, causing relatively little atmospheric heating. There is, then, a build-up of great amounts of cold air over the poles and or much warm air all along the equator.

Air that stays over an area of the Earth for a prolonged time takes on the characteristics of that area. There are four types of these air masses, the names of which are based on their origins:

- Maritime Polar - Formed over oceans in polar regions; moist and cool.
- Continental Polar - Formed over land areas of polar regions; dry and cold.
- Maritime Tropical - Formed over oceans in tropical regions; moist and warm.
- Continental Tropical - Formed over land areas of tropical regions; dry and hot.


CONTINENTAL POLAR
MARITIME POLAR
MARITIME TROPICAL
CONTINENTIAL TROPICAL
NORTH

MAJOR AIR MASSES OF NORTH AMERICA

BACKGROUND INFORMATION (Cont'd.)

Air masses move across the surface of the Earth because of differences in air pressure and the winds that these differences create. The leading edge of a moving air mass is called a front. Fronts are usually accompanied by cloudiness and precipitation.

The sun's radiant energy evaporates water into gaseous vapor from oceans, lakes, and other open water holes on the Earth. As this water vapor rises, it cools and condenses to form clouds. Clouds release their moisture as precipitation (rain, snow, hail, etc.) when the air's saturation point is exceeded (dew point). Precipitation reaching land surfaces will either:

1. Run off the surface, eventually reaching an ocean or some other large water body; or

2. Infiltrate the soil, where it becomes ground water.

Some of the water infiltrating the soil adheres to soil particles where it is available to be absorbed by plants. The greatest amount of ground water slowly percolates through the soil, working its way downhill until it eventually reaches an ocean or some other body of surface water.

Water is evaporated back into the air from all over the Earth's surface. In moderate climates, approximately 90 percent of the water absorbed by plants is evaporated or transpired into the air. This gigantic, world-wide system of condensation and evaporation is called the water cycle.

CURRICULUM OBJECTIVES

Students will be able to:

1. Define weather and identify its basic ingredients.

2. Describe the development of an air mass.

3. Distinguish between the four basic types of air masses and describe the nature of each.

4. Explain the basic stages in the water cycle and how the sun's energy provides the power for it.

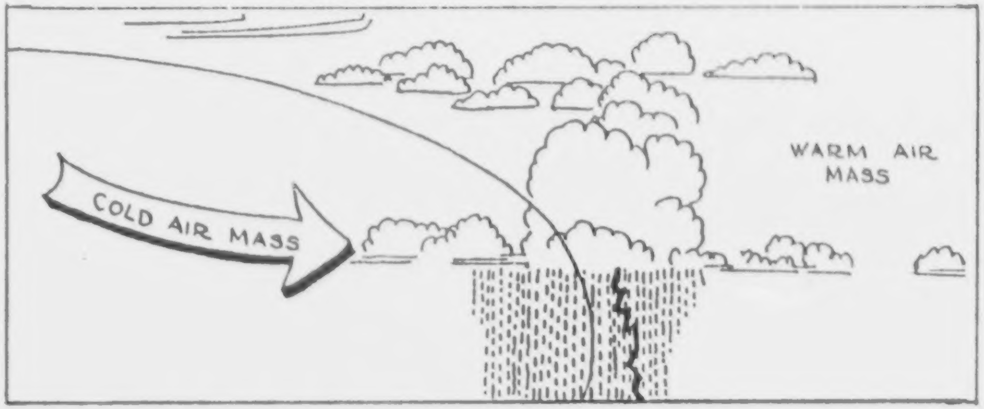
"DOING ACTIVITIES"

Students will be able to:

1. Spend half an hour in a group of four discussing physical factors in the environment relating to the concept of weather. For example, use such characteristics as temperature, humidity, cloud cover, and sun position.

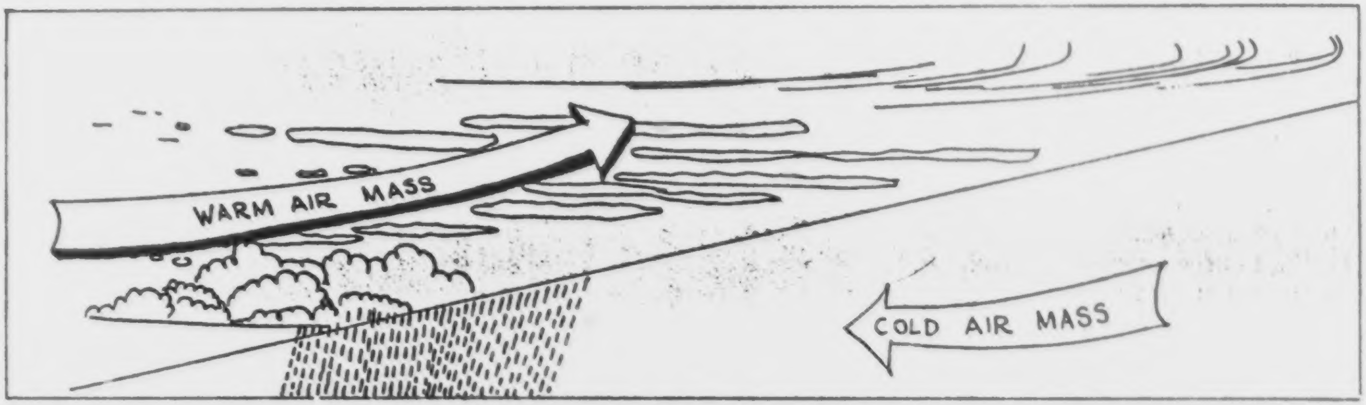
"DOING ACTIVITIES" (Cont'd.)

2. From a point overlooking a considerable expanse of the environment, find at least two areas that are producing different air masses (essentially mini-air masses); evaluate and perhaps challenge student choices.



3. In groups of four, label each student with the name of one of the four basic types of air masses. Each student should then demonstrate visually the character of the type of air mass he/she represents to the others in the group.

4. Build a water cycle model with areas representing mountains, flatlands, and large bodies of water. Then visually "walk through" the journey of a raindrop.



CONCEPTS

1. Climate is the generalized picture of weather conditions in an area.
2. The two dominant elements of climate are temperature and rainfall.
3. Climate is controlled by:
    - Latitude
    - Altitude
    - Topography
    - Prevailing winds
    - Distance from large bodies of water
    - Nearby ocean currents
4. The insolation (incoming solar radiation) of an area largely determines its climate and seasonal patterns.
5. California's winter weather is dominated by cyclonic storms from the northwest.

BACKGROUND INFORMATION

The climate of Southern California is termed Mediterranean because it has a short, wet winter and a long, hot, and dry summer. Climate is the generalized picture of weather in an area, not an "average" weather picture. On that basis, Southern California has a mild climate. It escapes the temperature extremes farther inland and provides sufficient moisture to support a varied natural habitat. The word climate comes from the Greek word for the angle or inclination of the sun's rays.

Insolation is the basic determiner of climate throughout the world. Specific determiners include:

1. Latitude - The distance from the equator (involves insolation).
2. Altitude - Modifies insolation.
3. Topography - The "lay-of-the-land" (involves insolation).
4. Prevailing winds.
5. Distance from large bodies of water.
6. Nearby ocean currents - Modifies surface air.

Southern California's summer weather is dominated by a high pressure area in the eastern Pacific which prevents cold front storms from reaching here. In the winter, the high pressure area in the eastern Pacific moves away and weakens, allowing cold front storms to come through. Santa Ana

BACKGROUND INFORMATION (Cont'd.)

winds occur when a strong high pressure area builds up over the Great Basin. When this happens, desert air pushes into the region, temperatures soar, and air humidity drops sharply.

The path of winter storms that brings the longest and heaviest rain is out of the Southwest. These storms move down from the Northwest over the ocean; and, at a point to the southwest, curve back to the mainland. The mountain ranges north of the Los Angeles Basin turn away some storms before they reach here. Those storms that round the coastal edge of the mountains or move in directly off the Pacific push against the face of the mountains, causing more rain or snow. When moist air is pushed by winds up the side of a mountain, the air cools and less water can remain in the air. Therefore, the heaviest precipitation is at the higher elevations.

In summary, the seasonal pattern of Southern California can be described as follows:

- Long, dry summer - Four months; occasional periods of some coastal morning fog.
- False spring - Two months; mild temperatures, some rain; many plants are stimulated to rapid growth and flowering.
- Short, wet winter - Two months; mild temperatures, occasionally heavy rainfall.
- Long, mild spring - Four months; variable weather, with much morning fog.

CURRICULUM OBJECTIVES

Students will be able to:

1. Define climate accurately.
2. Identify the two dominant elements of climate.
3. List a minimum of four factors which control regional weather and climate.
4. Explain why insolation is the most basic determiner of climate.
5. Explain the seasonal shift in weather patterns for Southern California.
6. Outline the origin and path of typical California winter storms.

"DOING ACTIVITIES"

Students will be able to:

1. Study daily weather charts in the newspaper over a period of a week. Observe air mass movements and the

"DOING ACTIVITIES" (Cont'd.)

weather they produce. (From November through March are the most dramatic movements.)

2. On the trail, describe the effects of winter storms being pushed against the mountains.

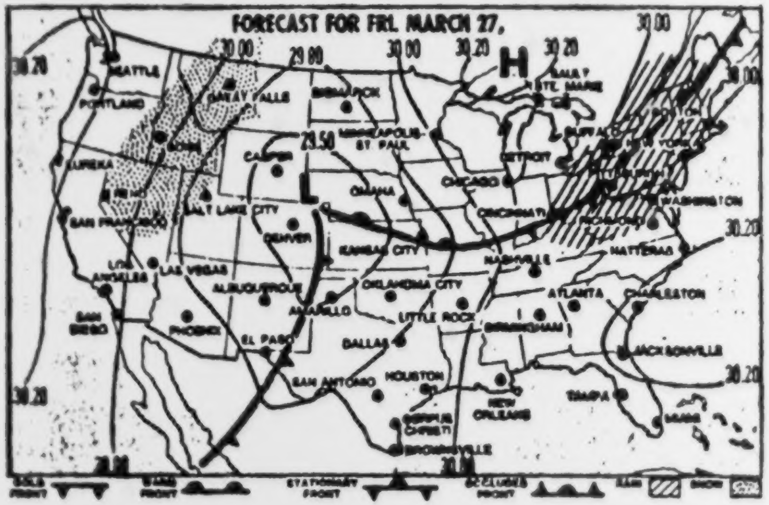
3. Use a flashlight and any round sphere to illustrate the spreading effect of the sun's rays on polar surfaces.

4. Use a map of the Los Angeles area to track a Pacific northwest storm as it "makes-the-corner" at Point Conception.

5. Before a trip, do research concerning the nature of the ocean currents off the California coast and their influence on the climate.

6. Use the accompanying weather chart to predict the weather for three consecutive days.

7. Compare their weather predictions for three days with the forecasts printed in a local newspaper.


FORECAST FOR FRI. MARCH 27.
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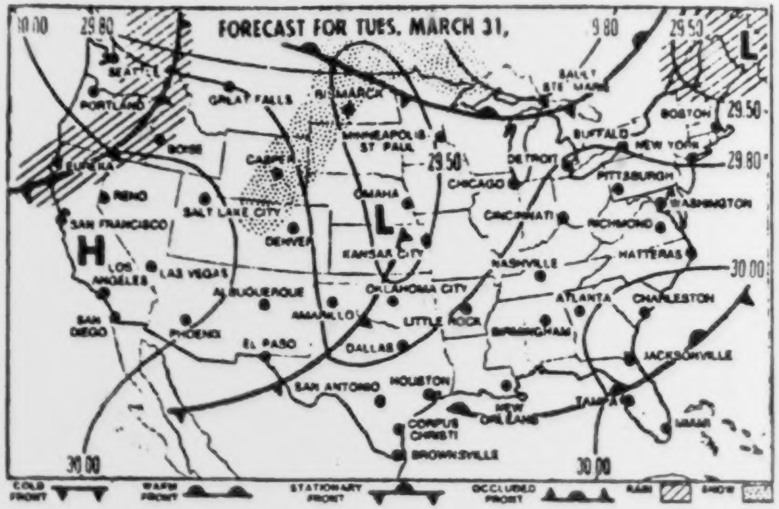
COLD FRONT
WARM FRONT
STATIONARY FRONT
OCCLUDED FRONT
RAIN
SNOW


FORECAST FOR TUES. MARCH 31.
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COLD FRONT
WARM FRONT
STATIONARY FRONT
OCCLUDED FRONT
RAIN
SNOW

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CONCEPTS

1. Clouds are made of small water droplets condensed by the cooling of the air's water vapor.
2. Fog is a ground level cloud.
3. Certain types of clouds are good indicators of the kind of weather to be expected.
4. Clouds produce precipitation when the air is cold enough to condense moisture and nuclei are present in the air upon which raindrops can be formed.
5. The type of precipitation which reaches the Earth depends on these variables:
   - Temperature
   - Humidity
   - Air currents

BACKGROUND INFORMATION

Much of what is properly termed weather cannot be seen. People cannot "see" the temperature, the air pressure, the humidity, or the wind. On the other hand, clouds are visual weather. A person can see what the air is like through clouds. A cloud is a visible collection of water droplets or ice particles suspended in the air. They are produced by the cooling of air to a point where the moisture in the air condenses. A cloud will disappear when the air becomes warm enough to reabsorb the water droplets.

There are three basic types of clouds. The name for each type comes from a Greek word which describes its form. The types of clouds and their root meanings are as follows:

1. Cumulus - "Heap"
2. Cirrus - "Curl or tendril"
3. Stratus - "Spread"

There is a variety of sub-classifications of clouds. These describe various combinations, heights, and gradations of the three main types (e.g., altostratus, cumulonimbus, etc.).

Fog is a ground-level cloud. "Fog clouds" form over land when the Earth rapidly loses heat into a clear sky at night and the water in the air condenses. This is called a radiation fog. When conditions over the ocean are such that warm, moist air is blown over cool surface water, an advection fog is formed. Coastal areas of California have such fogs when there is an up-welling of cold water currents.

BACKGROUND INFORMATION (Cont'd.)

Each type of cloud is a fairly dependable indication of the kind of weather to be expected. It will pay the camper/backpacker to learn the types of weather associated with the following kinds of clouds:

1. Cumulus - Fair weather is to be expected if the clouds are light and fluffy. If they are large and flat-headed, they are called cumulonimbus or "thunderheads." A violent thunder storm is then a distinct possibility.

2. Cirrus - These high, wispy clouds indicate the approach of the front edge of a warm front. Rain is to be expected from such a front; but, in Southern California, cirrus clouds may appear from storms passing north of the mountains, which means no rain will fall in the Los Angeles area. The direction of cloud movement is therefore very important. Cirrus clouds from the south or southwest indicates a possibility of rain within the next day or so.

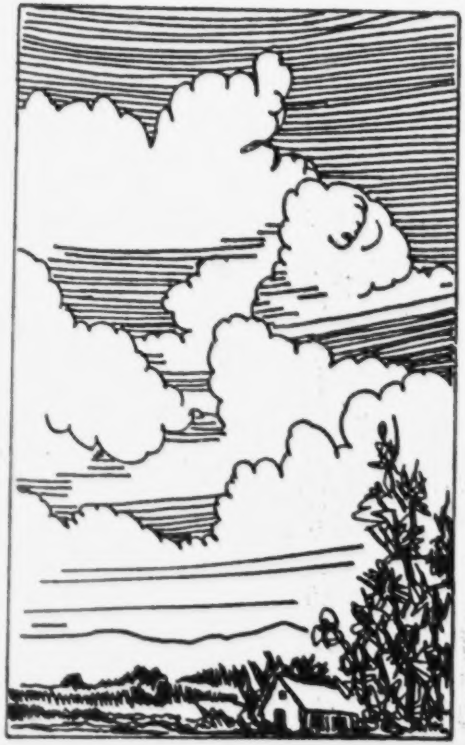
3. Stratus - Solid layers of clouds of this type may mean drizzle and always signify lower temperatures because they intercept the sun's rays. When dense enough, such clouds may produce a long, steady rain.

The precise explanation for the cause of precipitation still eludes scientists. Cloud droplets are so tiny and the resistance of air so great that the droplets easily ride the air. If these droplets collide, they tend to bounce off one another unless they are very large. What brings a million of them together to form a raindrop or a snowflake heavy enough to fall to Earth? Scientists puzzle more over the way in which water falls from the sky than over how it reaches there.

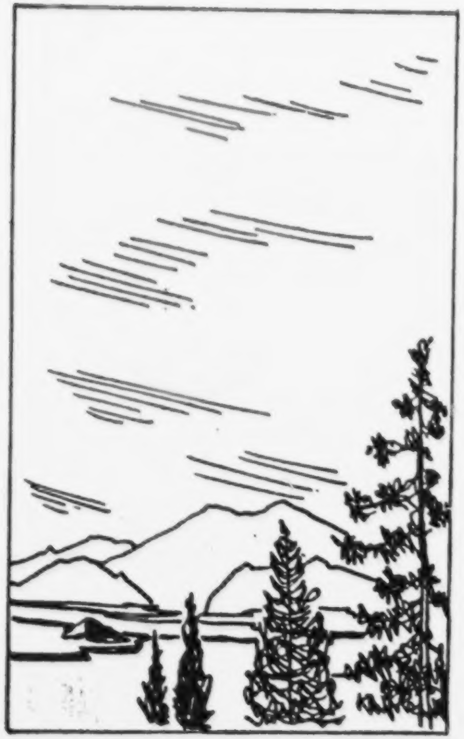
The majority of scientists believe that rainfall occurs in one of two ways, depending on the temperature of the clouds and the nature of the nuclei which they contain.

Warm rain that falls in large, splashy drops is believed to be caused by a coalescence of the tiny droplets. In tropical type clouds, temperatures are considerably above freezing so the collecting nuclei are thought to be salt crystals or perhaps even dust particles. In such clouds, convection currents are particularly strong. The resulting churning action increases chances for collision and the formation of raindrops. The infrequent summer rainstorms in the Los Angeles Basin fit this category.

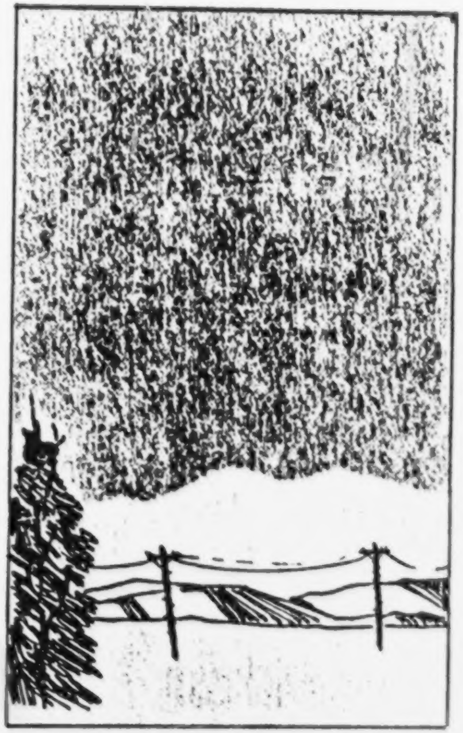
A second method of forming raindrops is responsible for most rainfall in temperate zones of the Earth, such as in Southern California. It is believed that ice crys-



CUMULUS CLOUDS



CIRRUS CLOUDS



STRATUS CLOUDS

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BACKGROUND INFORMATION (Cont'd.)

tals form at sufficiently cold temperatures. For complex reasons, the crystals cause surrounding droplets to vaporize and recondense on the crystals. These "fattened" crystals then begin to fall through the clouds and to the Earth. Normally, temperatures are warm enough to melt these crystals while they fall and to produce rain. Thus, the theory is that, "Most rain begins as snow."

If the temperature of the air is cold all the way to the ground, "dainty aggregations" of these ice crystals form. They are called snowflakes. Flakes may leave a cloud, hit a layer of warm air as they descend, and melt, only to enter a colder air layer near the ground and refreeze. The ice pellets thus produced are called sleet.

Hail, which also is a form of precipitation, is the particular product of thunderclouds (cumulonimbus). The tops of these huge clouds can be from six to ten miles high. Temperatures within them may vary greatly from top to bottom, causing great updrafts and downdrafts. Water droplets are alternately frozen and thawed as they circulate in the clouds. They collect more water during this process and eventually leave the clouds to fall as hail.

An average of 40 inches of rain falls all across the Earth's surface during each year. Only one-fourth of this rain falls on land. One-third of all solar energy reaching the Earth is expended in evaporating water. The amount of water involved is 95,000 cubic miles per year or 105,000,000,000,000,000 (quadrillion) gallons.

Weather therefore involves gigantic movements of air and water and the expenditure of a staggering amount of energy.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify a cloud accurately.
2. Describe how precipitation is produced from clouds.
3. Describe fog as a type of cloud and explain its formation.
4. Explain the three basic types of clouds and describe the weather to be expected from each.

"DOING ACTIVITIES"

Students will be able to:

1. Use data from an almanac, encyclopedia and/or local weather service to find:
   - Average Los Angeles rainfall.
   - Average mountain rainfall. (Choose a specific location for comparison, such as Big Bear.)
   - Monthly rainfall patterns in Southern California. (How much does rainfall vary in different locations?)
2. Demonstrate cloud formation by condensing steam on cool glass or metal.
3. Explain why fog is called a colloid, and show examples of other colloids (gelatin, india ink, etc.).
4. On construction paper, make cotton models of the various types of clouds.
5. During a hike, use the clouds observed to predict the weather for the following day. Predictions should be explained and defended before the class.
6. View slides of clouds to learn the basic types and associated weather.

KWST·WEATHER

"...AND NOW THE WEATHER. VARIABLE HIGH CLOUDS TODAY INCREASING TONIGHT WITH A SLIGHT CHANCE OF LIGHT RAIN. HEAVY RAIN IN THE CITY TONIGHT FOLLOWED BY THUNDERSHOWERS TOMORROW."

CONCEPTS

1. The Los Angeles Basin is an area of persistent winds from the southwest called the prevailing westerlies.
2. Winds are caused by differences in air pressure, and these, in turn, are largely determined by differences in air temperature.
3. Local winds are caused when dissimilar surface areas heat and cool at different rates (e.g., shore breezes).
4. Santa Ana winds are caused by the drainage of dense cold air from the high inland Great Basin.

BACKGROUND INFORMATION

It is difficult for most people to conceive of weather outside the context of the phenomenon called wind. In its simplest sense, wind is merely the movement of air. Because of the shape and behavior of the Earth and its relationship to the sun, major wind belts do occur. Los Angeles is located in what are called the middle latitudes, approximately 30° to 60° north of the equator. This is an area dominated by the prevailing westerly winds. Unless there is a storm system coming through the area or some local disturbance creates its own wind, Southern California receives a year-round flow of wind from the southwest. However, because of the persistent east Pacific high, the wind flow circles around to reach the region from the northwest.

The reason for all wind is a difference in air pressure. It in turn, is the result of a change in air temperature. When air is heated, it becomes less dense and lighter. Cold air is dense, heavy air. Areas anywhere on the surface of the Earth which have higher air temperature than that of surrounding areas become low-pressure areas or lows. The centers of coldest air in an area are called highs. Just as water flows downhill, air flows from highs to lows.

Two specific local conditions create wind flow. All along the Southern California coastline there are shore breezes. Because the land surface heats and cools much more quickly than does water, differences in air temperature are created. This is especally true on days which are not cloudy. As the land warms quickly during the morning hours, an on-shore breeze from the ocean results. In the evening, as the air over land loses its heat, the now cool air blows to the warmer oceans. This is referred to an an off-shore breeze.

The second category of local winds is the thermal slope breeze. These winds are extremely significant to the hiker or camper. Again, when the air is clearest, the most

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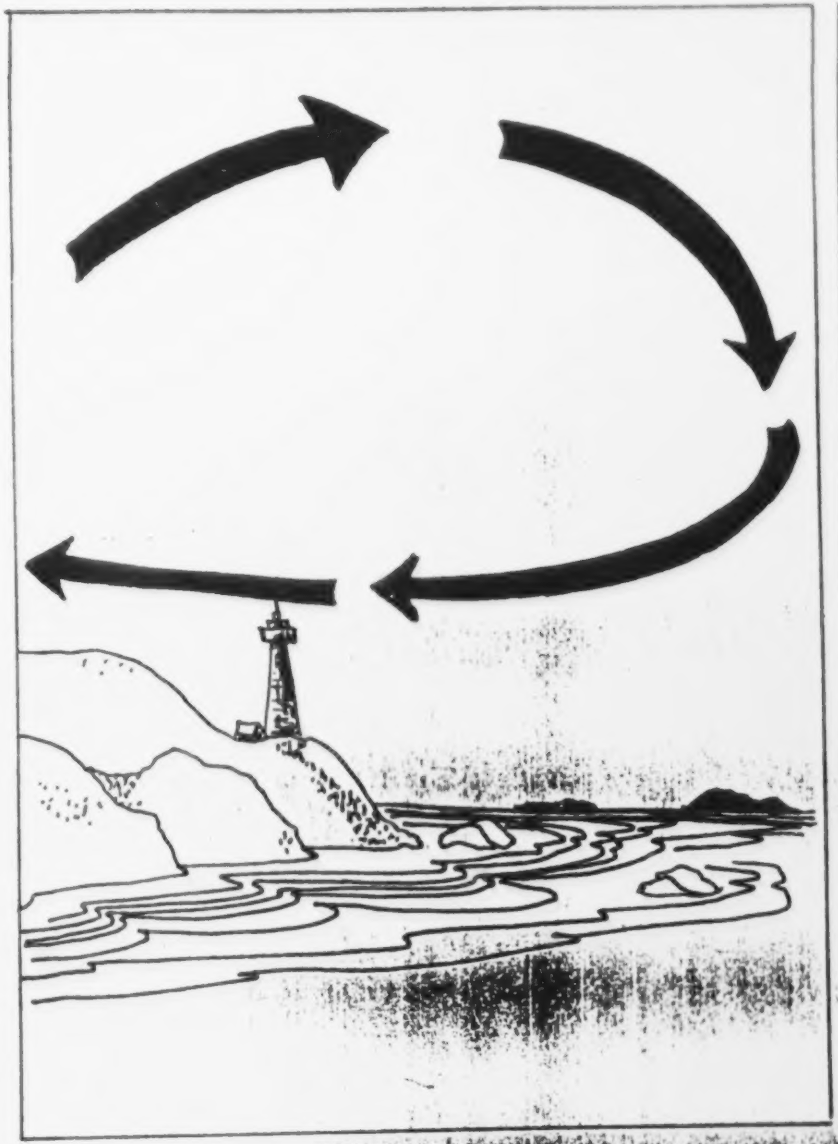
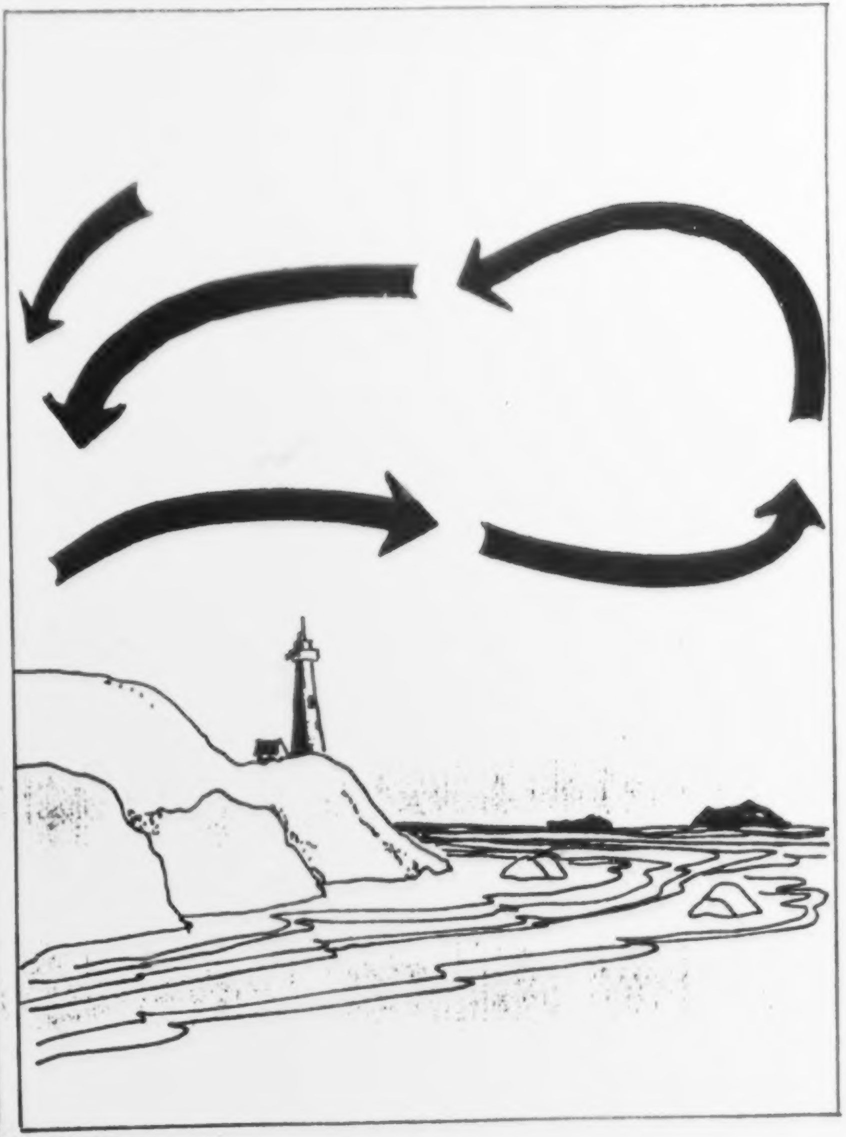


ONSHORE



OFFSHORE

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BACKGROUND INFORMATION (Cont'd.)

marked winds are created. When evening comes, the air higher in the mountains, being less dense, loses its heat more quickly then does the air at lower atlitudes, thus causing "downslope breezes." In the morning the "clear" mountain air heats up more quickly than does the dense moist air below. Therefore, the flow of air is reversed, creating an upslope or valley breeze.

Anyone living in Southern California has heard of and experienced the Santa Ana or "witches' wind." Its causes are far flung. The Santa Ana is a drainage wind, which emanates from extensive pockets of cold air. The source of the Santa Ana is air that develops over the mile-high Great Basin and which is trapped between the Sierras and the Rockies. As this cold, dense air develops, the only escape path lies to the south. When it moves in this direction, the air drops in elevation and warms by compression. The speed of the this drop and the conditions in areas through which it passes determine the eventual temperature of the air. As the air breaks free of the desert and moves through mountain passes, it spreads quickly through the coastal basins and canyons. The air may arrive in Southern California cold, mild, or warm, but it is always dry.

Hiking during a "Santa Ana condition" is a "mixed bag." The air is startlingly clear, and the mountains around you are bright and breathtaking. However, the fire danger is extreme, and precautions should be increased to protect your group. It is best to "cold camp" (exclude the use of fire) under Santa Ana conditions.

Scientists have found that these winds have many psychological and physiological effects. People are often irritable and easily depressed during a Santa Ana wind. High levels of static electricity make even a simple handshake "a shocking experience." It is indeed a local wind, but its cause extends over a great distance, and its effect is dramatic.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize that Southern California is located in a global wind belt called the "prevailing westerlies" and describe the direction of this wind flow.
2. Describe conditions that mask the flow of the "prevailing westerlies."
3. Explain the relationship between wind, air pressure, and temperature.

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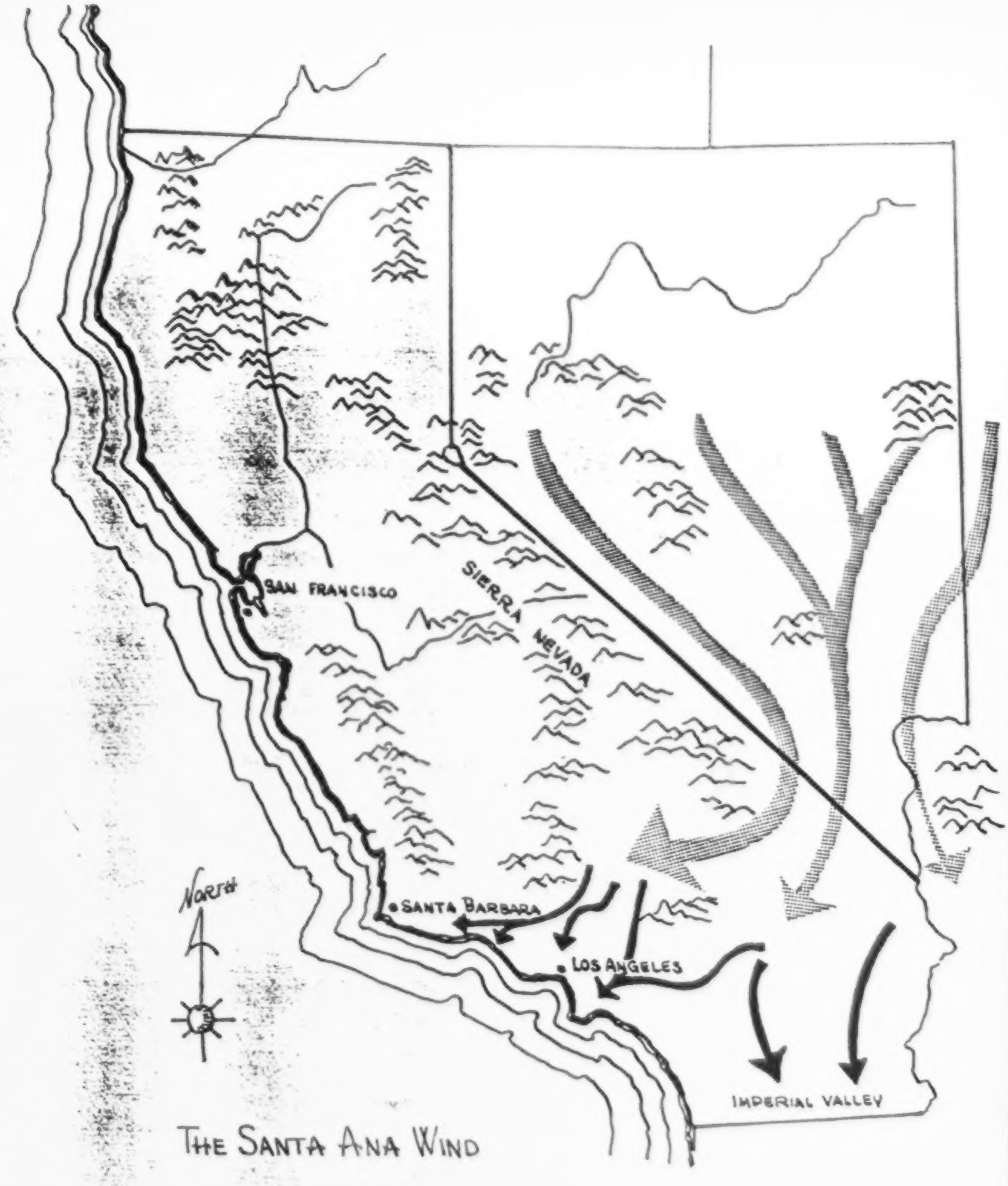
SAN FRANCISCO
SIERRA NEVADA
SANTA BARBARA
LOS ANGELES
IMPERIAL VALLEY
NORTH

THE SANTA ANA WIND

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CURRICULUM OBJECTIVES (Cont'd.)

4. Explain the nature and cause of shore breezes.

5. Explain the nautre and cause of thernal slope breezes.

6. Describe the cause and nature of Santa Ana winds.

7. Describe the possible effects of a Santa Ana wind on a hiking experience.

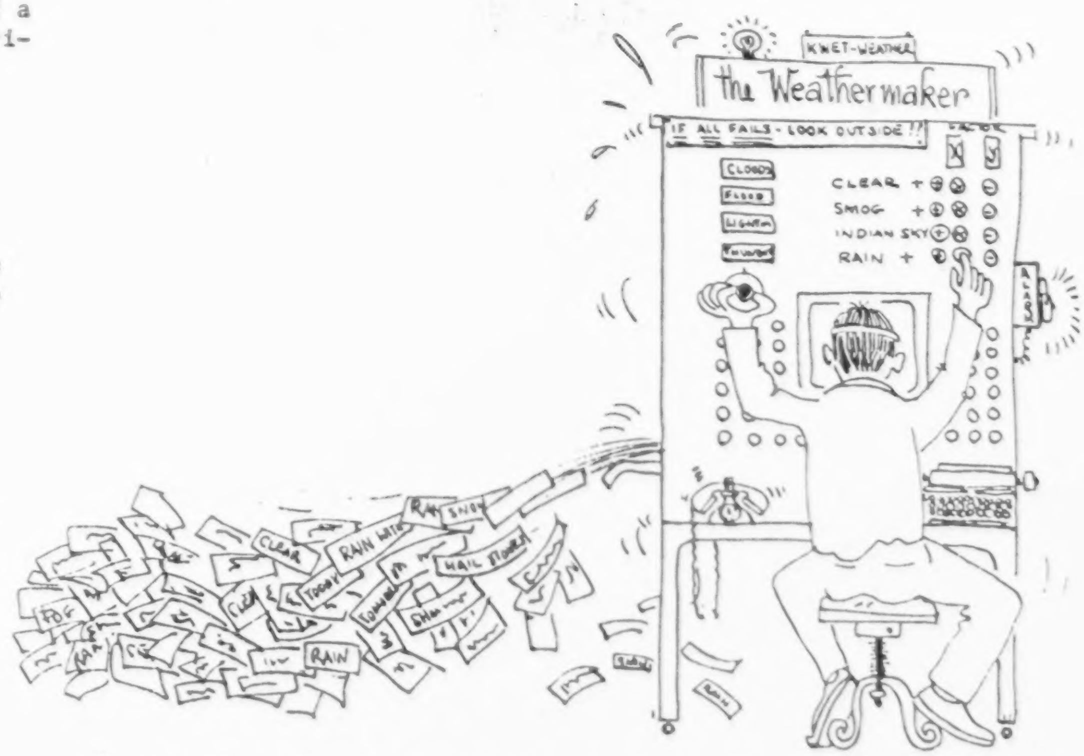
"DOING ACTIVITIES"

Students will be able to:

1. Check weather maps before a hike and predict wind conditions. To be considered are:
    - Storm systems
    - Clarity of air
    - Santa Ana conditions
    - Exposure of trail to elements
    - Elevation
    - Temperature

2. On the trail, use a moistened finger extended into the air to determine the direction of air flow. Explain the probable cause of such air flow.

3. Do research on the frequency of severe Southern California fires and their correlation to Santa Ana winds.


KWET-WEATHER
the Weathermaker
IF ALL FAILS - LOOK OUTSIDE!!
CLOUDS
FLOOD
LIGHTN
THUNDER
CLEAR +
SMOG +
INDIAN SKY
RAIN +
CLEAR
RAIN WITH
SNOW
HAIL STORMS
TODAY
FOG
RAIN

"IF YOU THINK THIS IS BAD, YOU SHOULD HAVE BEEN HERE YESTERDAY!!"

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CONCEPTS

1. A thunderstorm is created in clouds high enough to create thermal imbalance.
2. A thunderhead cloud builds areas of positive and negative electrical charge which discharge as lightning.
3. Lightning usually strikes the highest point in its vicinity.
4. The passage of the lightning charge through the air heats it, causing a rapid expansion and a great sound wave called thunder.

BACKGROUND INFORMATION

Thunderstorms are classic displays of violent weather. There are approximately 45,000 thunderstorms every day of the year in the Earth's atmosphere. A thunderstorm is created when there exists a deep thermal imbalance in the atmosphere, and there is sufficient moisture to raise huge clouds. These huge clouds are called cumulonimbus or thunderheads. They are quite cold at their tops and much warmer at their bases. The thermal imbalance causes convection currents to form within the clouds. These currents sometimes move air upward at speeds of 60 miles per hour or more.

At the top of these clouds, which can rise to 25,000 feet or more above sea level, ice crystals form, while at their base drops of rain form. Some of these rain drops are carried in the turbulence to great heights in the clouds, where they freeze. These, then, fall to lower levels, where snow and water stick to them, only to be carried upward once more. After a series of such ups and downs, the ice drops become so heavy that they fall to the Earth as hail.

The turbulence of the thunderhead causes the water droplets to become electrically charged because of the friction between air and water.

As the cloud grows, the charges in it continue to build until a discharge occurs, creating what is called lightning. This lightning can be:

1. Cloud to cloud - Between positive and negative areas in developing clouds.
2. Cloud to ground - Between a cloud base (negative charge) and some prominent point on the ground (positive charge).
3. Ground to cloud - Discharge spark proceeding upward to cloud base (positive charge).

BACKGROUND INFORMATION (Cont'd.)

Lightning is one of nature's most consistent performers. It will strike twice and more in the same place. The tallest object in the vicinity of the discharge will usually receive the spark.

The tremendous energy of a lightning discharge causes heating and rapid expansion of the air. This expansion causes a great sound wave called thunder. A person can estimate the distance of a lightning strike by counting the seconds between observation of the flash and hearing the thunder clap. Sound travels just over 1,000 feet per second; thus, in 5 seconds, it covers one mile; or, in 3 seconds, it travels one kilometer.

Thunder and lightning are more common in the mountains during late summer or fall because the mountains act as barriers forcing rain clouds to greater heights than they normally would reach. When moist, warm air systems push into our mountain areas, thunderstorms are common.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain the general nature of a thunderstorm.
2. Explain why heavy rain and hail are associated with a thunderhead.
3. Explain the formation of the electrical discharge that is called lightning.
4. Recognize that lightning strikes the highest point in its vicinity.
5. Explain the causes of thunder.
6. Explain why thunder and lightning are more common in the mountains.

"DOING ACTIVITIES"

Students will be able to:

1. Do research on weather records to determine the times of the year that thunderstorms occur in Southern California mountains.
2. When observing a display of thunder and lightning, find the distance to the place where the strike occurred. The sound of thunder travels 1,000 meters (1 kilometer) in 3 seconds.
3. While stopping at any point along the trail, predict objects in the area that are most susceptible to receiving a lightning strike.
4. While on the trail, determine the best places to take cover in a thunderstorm.
5. Blow up a balloon and pop it. Describe how the resulting sound is similar and dissimilar to the sound produced by a lightning strike.

CONCEPTS

1. Mountain topography increases the variations of insolation.
2. There is a predictable cooling of air as the altitude increases.
3. The windward sides of mountains receive much greater precipitation than do the leeward sides.
4. Thunderstorms are more common in the mountains than at sea level.

BACKGROUND INFORMATION

In the mountains, there seem to be no neutral moments in regard to weather. Mountain weather is free-flowing. Every foothill, valley, canyon, and peak has its unique pattern, which may be bold, violent, amplified, and dramatic. It is, therefore, in the mountains that the concept of micro-climate is most fully expressed. Pockets of weather are fitted intricately into geographic features of slope, exposure, and elevation. Hikers can experience within a few miles a great variety of weather conditions.

One of the basic reasons for such variations of weather is the effect of differing mountain topography (the lay-of-the-land) on the insolation (incoming solar radiation) received. The sun's rays heat the air as they are reflected from the Earth's surface. On flat land, differences in air heating occur gradually, but, in the mountains, every variation in the land surface changes the heating level of the air.

Compounding the variations in the heating of mountain air is the fact that it changes temperature more dramatically since it is relatively thinner than valley air. Since there are fewer molecules of air at higher elevations, it cannot carry as much heat. Everyone has noticed the sudden temperature change in the mountains when he/she walks from shade into sun light or vice versa. The temperature drops an average of 1 degree F for every 300 feet in elevation gained (1 degree C for every 50 meters). This guideline can also be expressed as 3.5 degrees for every 1,000 feet (6.3 degrees C for every 1,000 meters). Higher altitude, then, means thinner air (fewer molecules), which can be measured as lower air pressure. As air pressure becomes less, the air's ability to retain heat decreases, and cooler temperatures result.

The mere presence of a mountain influences weather. As an air mass is pushed by winds against the slope of a mountain, the air is forced upward and cooled. This cooling causes water vapor in the air to condense and form clouds that grow larger and more saturated until precipitation occurs. Therefore, amounts of rain or snow increase

BACKGROUND INFORMATION (Cont'd.)

on the windward side of a mountain as the elevation increases. As clouds "spill over" the mountain crests, they drop in elevation; and the air, being warmer, reabsorbs most of the remaining water vapor. This being ture, it rarely rains. The resulting dry areas on the leeward side of the mountains are called rain shadows.

There is an inseparable correlation between mountains and winds. Upslope and downslope winds occur almost daily because of the uneven heating and cooling at various elevations. Mountain passes, valleys, and canyons become "wind ways" when certain regional conditions cause large air movements (e.g., Santa Ana winds). It is also important to note the persistent winds on mountain tops and high, exposed ridges. One reason for such winds is that mountains rise through the clutter of sea level disturbances into the global prevailing winds. Only on high mountains and on the ocean can a person usually experience the "prevailing westerlies."

Thunderstorms are more common in mountains than in the surrounding lowlands. The reason is that thunder clouds form and discharge their violence when warm, moist air is raised to high elevations. Mountains become a mechanism to increase the altitude of such clouds and "set them off."

Hiking in the mountains is almost always a "weather adventure." Change is constant and often dramatic. A hiker or backpacker is wise to be aware of the kind of weather with which he/she may be confronted and to be prepared with proper clothing to enjoy whatever comes. It is also wise to know the precautions to be taken when dangerous weather conditions exist.

CURRICULUM OBJECTIVES

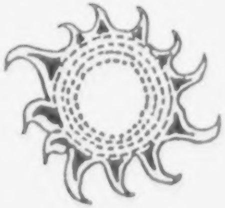
Students will be able to:

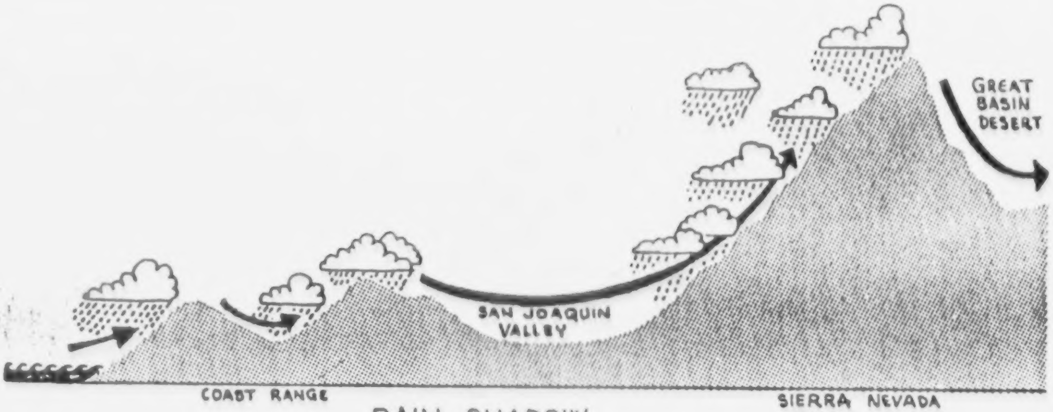
1. Describe how mountain topography affects insolation.
2. Explain why air heats and cools more rapidly at higher elevations.
3. Describe why the windward sides of mountains receive more rain than do leeward sides.
4. Outline the basic reasons for increased winds in the mountains.
5. Explain why thunderstorms occur more frequently in mountains.
6. Describe what should be done to prepare for the weather that may be encountered on a trip.

"DOING ACTIVITIES"

Students will be able to:

1. Study the topographic map of the area in which the hike will occur and use the knowledge gained concerning slope, exposure, and altitude to predict the weather conditions.
2. Study weather maps before the trip to anticipate major weather conditions.
3. Take an air thermometer on the trail and keep a day-long log of temperatures at specific times. This data should than be studied by the class to look for variations and the possible reasons for them.
4. If it is possible to take along a psychrometer (device for measuring air humidity), keep a log as described in 3. above.
5. Use a moistened index finger and a compass to take periodic readings of wind direction. Careful logging of the data will enable class members to evaluate the reasons for the variations.





RAIN SHADOW

Cross Section Of California

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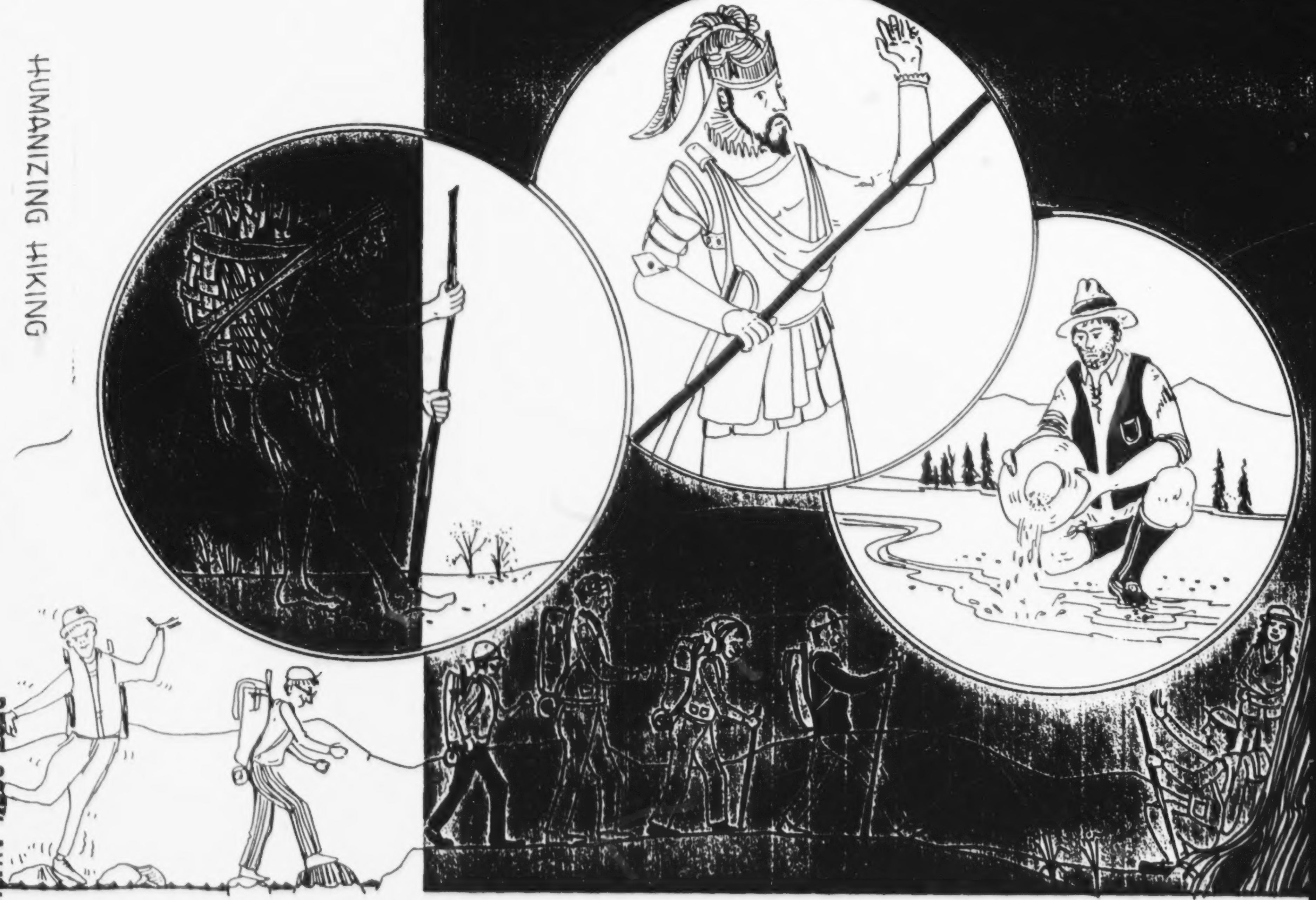
HUMANIZING HIKING



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CONCEPTS

1. The Hokan-speaking tribes lives in the Los Angeles Basin and the San Gabriel Mountains until 500 B.C.
2. Various tribes of Shoshonean-speaking Indians replaced earlier groups.
3. The Shoshone Indians were artistic people, producing intricate baskets, stone bowls, and plank canoes.
4. The immigration of European settlers area caused much of the Indian population and their villages and their culture to disappear.

BACKGROUN INFORMATION

The earliest Indians to live in the Los Angeles Basin and the San Gabriel Mountains spoke the Hokan language. They were replaced by Indians of the Shoshone culture. All that is known of the Hokan-speaking people has come by way of Shoshone tales and archeological exploration. The displacement of these people by the Shoshones appears to have occurred gradually.

The Shoshone Indians of California were distantly related to the Great Plains tribes and the Hopis of Arizona. The Indians came to what is now California via the mountain passes in the San Gabriels. They established a series of villages along the foothills and on the plains of the Los Angeles Basin.

Among the tribes living in the region when the Spanish settlers arrived were the Gabrielinos, Serranos, Chumash, and Cahuilla.

The Indians built their houses of willow frames and thatched them with tule reeds. They did not make pottery until the time of the Spanish missions but carved fine cooking pots from soapstone. This they obtained by trading with tribes living on the Channel Islands. Beautiful stone knives, pipes, and animal figurines were also carved by these people.

The Indians were a food-gethering and hunting people. Acorns, collected in the oak woodlands, formed the staple of their diet. They also ate berries, wild plums, seeds, and the meat of ground squirrels, rabbits, deer, and bears.

The people who lived along the sea coast and on the Channel Islands fashioned sturdy canoes from pine planks. These were used for fishing and trading purposes. The Indians also made canoe-shaped rafts from tule reeds for use on calm lagoons.

For hunting and war, the Inidans used bows about 4½ feet in length and arrows with or without stone or bone heads. Although not long in duration, the wars were very bloody. Male prisoners were killed, while women and children were kept as slaves by the victors.

BACKGROUND INFORMATION (Cont'd.)

The religion of these Indians was rich in tales about their early travels and about the creation of the earth, the animals, and people. The central figure in their religion was a god associated with the sun and called Chingichnich.

CURRICULUM OBJECTIVES

Students will be able to:

1. Identify the two major groups of Indians who lived in the San Gabriel Mountains and the Los Angeles Basin as being from the Hokan-speaking and Shoshone-speaking tribes.
2. Describe three cultural characteristics of the Shoshonean-speaking Indians at the time of the Spanish exploration.
3. Explain the disappearance of the Hokan-speaking Indians.

"DOING ACTIVITIES"

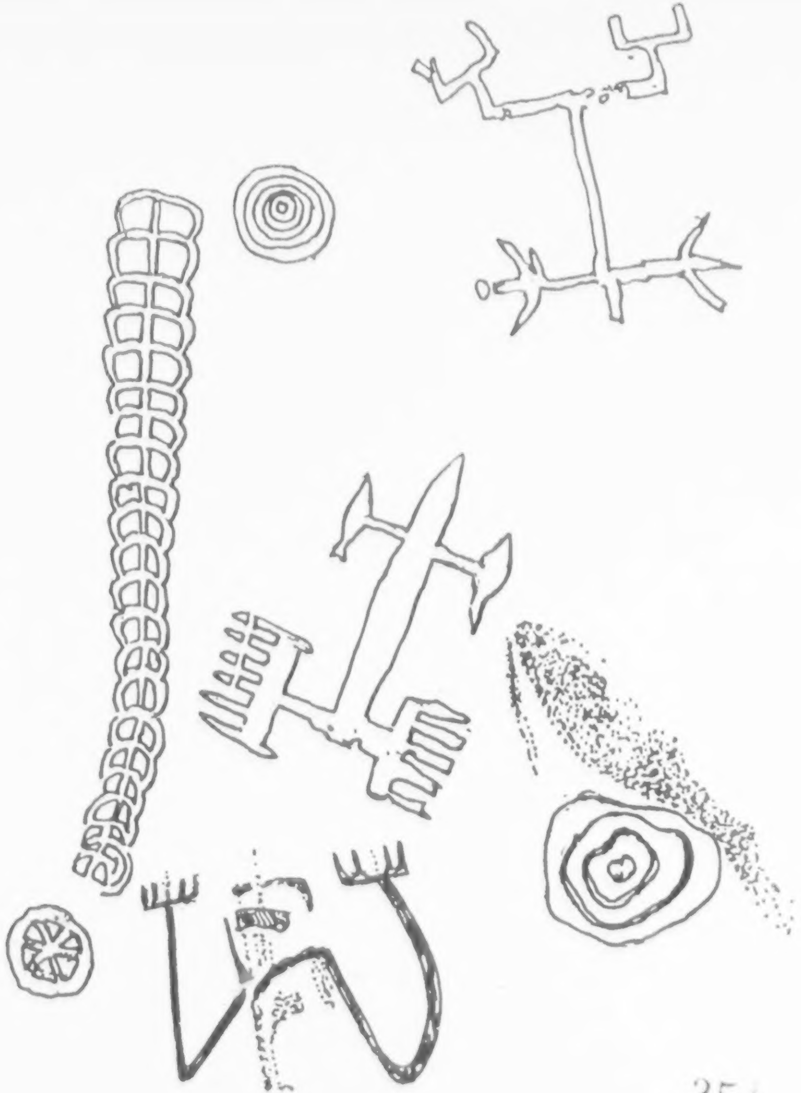
Students will be able to:

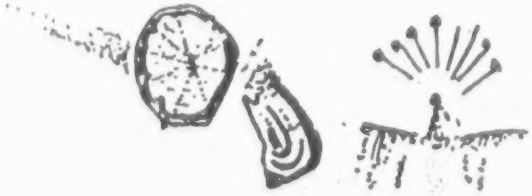
1. Study maps showing the migration of the Shoshonean-speaking Indians across North America. What relationships were there between the Shoshonean-speaking Indians of California and other Shoshonean-speaking tribes in Arizona and/or South Dakota?
2. Visit a museum in the Los Angeles area which has a good display of California Inidan artifacts. What special characteristics do artifacts have? Sketch some of the handicrafts on exhibit. (Examples of artifacts include baskets, steatite bowls, and stone tools, mortars, and pestles.)
3. On a hike in the San Gabriels, list some of the foods which the Indians would have eaten.
4. Do research concerning the mythology and religion of the Gabrielino Indians. Recite some tale from Indian lore.
5. List some of the values that they believed were important to the Indians. List some of the values considered important to modern culture. Compare both value systems.
   - What are the advantages of each culture?
   - What are the disadvantages in both?
   - What "trade-offs" are evident in this comparison?

"DOING ACTIVITIES" (Cont'd.)

6. Do research concerning the pictographs and petroglyphs of Southern California Indians and distribute copies of them. Then tell an Indian story, and ask class members to record their version of it, using the Indian symbols.

7. At a campfire, discuss the culture and lifestyle of the Indians. What were their daily habits? How did they survive in the wilderness? What was their government structure like? How did they feel about aging and death? Compare and contrast their way of life with that of people today.





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CONCEPTS

1. The first Europeans to arrive in the San Gabriels were members of the Gaspar de Portola expedition.
2. The Spanish founded Mission San Gabriel on the Rio Hondo in 1771 and gave the name of the mission to the mountains as well.
3. Spanish ranchos were established in the valleys below the San Gabriel Mountains.
4. The Spanish used the mountains primarily as sources of water and timber supplies.

BACKGROUND INFORMATION

On August 8, 1769, the Spanish expedition of Gaspar de Portola crossed the San Gabriel Mountains at San Fernando Pass from the north. This event marked the first time Europeans had set foot in this California range.

Within two years, the Spanish had founded Mission San Gabriel on the banks of the Rio Hondo. Mission San Gabriel became the focal point for Spanish activities in the Los Angeles Basin. The mission priests named the nearby mountains after their patron saint and quickly incorporated the Gabrielino Indians into the mission community.

Timber from the canyons of the San Gabriels was used to construct the mission and pueblo buildings. With the labor of the Indians, the friars constructed irrigation canals and soon had extensive gardens, orchards, and vineyards under cultivation.

The Spanish government granted large tracts of land in the area to four soldiers who had been members of the first expeditions to California. From these land grants, the spacious ranchos of San Fernando, Santa Anita, San Rafael, and San Pedro were created.

Spanish vaqueros were soon caring for vast herds of cattle and horses along the alluvial plains and valleys below the mountains. They hunted game (deer and rabbits) in the lower canyons and foothills. They also stalked and captured grizzly bears, which were then common in the San Gabriel Mountains. The huge animals were then used in popular bear-bull fights in El Pueblo de Los Angeles.

In 1819, timber was cut in Millard Canyon to build the Plaza Church in Los Angeles. The logs were rolled and dragged down the canyon and then hauled by oxen to Los Angeles.

The Spanish Period came to an end in 1821 when Mexico achieved its independence. But the Mexican rule of California was short-lived, ending when the United States assumed power over the territory in 1847.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain the use of land in Southern California by early Spanish settlers.
2. Describe the activities of the Spanish ranchos.
3. Discuss the Spanish expeditions to California in terms of their impact on individual expedition members.

"DOING ACTIVITIES"

Students will be able to:

1. Study maps of the Spanish/Mexican Period (1769-1821) in Southern California. What was the principle land use of the Los Angeles Basin at that time? How do land use patterns of that era compare with those of today?
2. Do research and write group reports on the ranchos of Spanish-California days.
3. On hikes in lower canyons of the San Gabriels, try to imagine what it was like to have been on the first Spanish expedition to this area. Through drawings, stories, or poems, express their feelings about the experiences of the first explorers.

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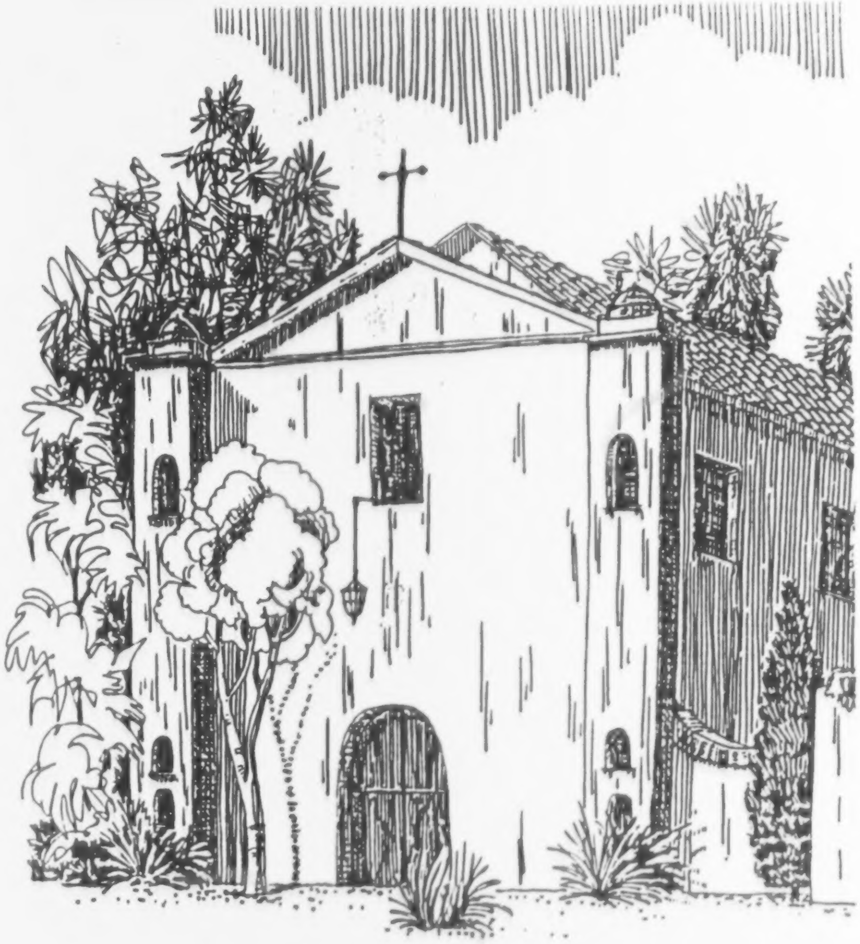


THE SAN GABRIEL MISSION

CONCEPTS

1. Gold was discovered in 1842 in Placerita Canyon, spurring growth of the Los Angeles area.
2. Pioneers homesteaded land in all the canyons north of Pasadena.
3. Cattle rustlers used the San Gabriel canyons as hideouts.

BACKGROUND INFORMATION

As the westward pioneer movement brought more and more people to California, the Los Angeles Basin began to experience its first population boom. This was greatly stimulated by Francisco Lopez' discovery of gold on the roots of wild onions he dug up in Placerita Canyon in 1842. Prospectors were soon searching for gold in the gullies and hillsides of Big Tujunga, Arroyo Seco, and Santa Anita Canyons.

In 1858, gold was discovered in Big Santa Anita Canyon, and a mining company was formed by a group of Los Angeles businessmen. Miners used hydraulic methods in their search and found considerable wealth in this area as well as along the East Fork of the San Gabriel River.

A mining boom town called Eldoradoville sprang into existence in 1859 near the mouth of the San Gabriel Canyon. A flood destroyed the town in January , 1862, and the gold rush era in the San Gabriels came to an end.

Pioneer settlers in the mountains were hardy and independent. They settled along the upper foothills and raised fruits and vegetables. One of the earliest settlers was Robert Owen, a former black slave, who had bought his freedom in 1853 and moved to the San Gabriels from Texas. He settled near Millard Canyon and the Arroyo Seco and eventually saved enough money to buy freedom for his wife and children.

Two other settlers associated with the fight to end slavery were Jason and Owen Brown, sons of Abolitionist John Brown. Owen had been with his father during the Harper's Ferry raid. The brothers built a small cabin in the Millard Canyon foothills. They named a mountain above El Prieto Canyon after their father, and Owen Brown was buried near Brown Mountain on a small hill known as Little Round Top. His roughly inscribed granite tombstone still stands.

From 1850 until 1870, cattle rustlers and horse thieves used the maze of canyons in the San Gabriels as hideaways. The most famous bandit was Tiburcio Vasquez, who thought he could help regain California for Mexico. He and his gang terrorized the people of the Los Angeles Basin, making raids on ranches and then retreating to a hideout in Big Tujunga Canyon. He was finally

BACKGROUND INFORMATION (Cont'd.)

captured near Cahuenga Pass in 1874. Vasquez Canyon was named for this famous outlaw.

CURRICULUM OBJECTIVES

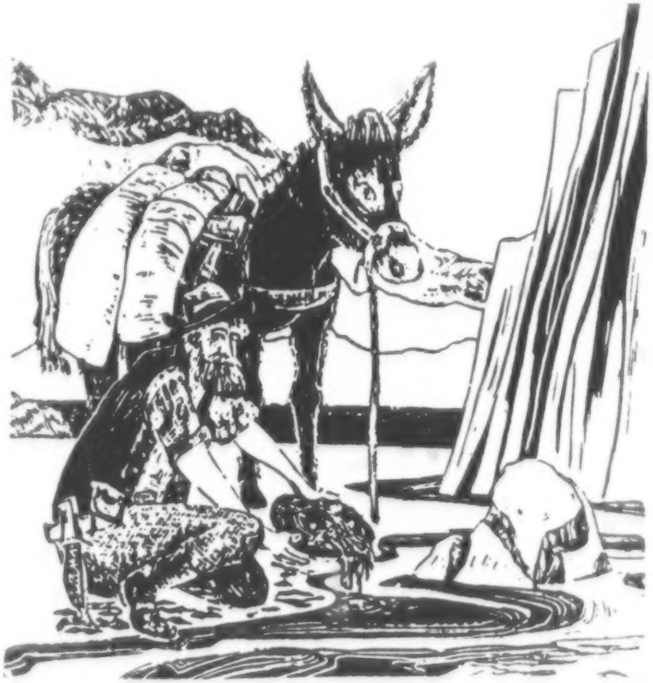
Students will be able to:

1. Describe the early gold mining activities in the San Gabriel Mountains.
2. Identify a pioneer homesteader in the San Gabriel Mountains and explain his importance.
3. Recognize that the canyon country of the mountains provided refuge for outlaws and bandits.

"DOING ACTIVITIES"

Students will be able to:

1. Do research concerning early gold mining techniques. What impact does gold mining have on wilderness areas? Is there evidence of gold mining operations in the San Gabriels today? What suggestions do you have for reducing the impact of mining on wilderness areas?
2. On a hike in Millard Canyon and the Arroyo Seco area, discuss some of the early pioneers who homesteaded then. Do some preliminary research before going on the hike. Report on some aspect of a pioneer's life.
3. While hiking through the lower canyon areas, discuss what characteristics of these canyons made them good hideouts for bandits. At a campfire, tell or write stories/poems about the cattle rustlers.



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CONCEPTS

1. Resort cabins and pleasure hiking trails were built in the San Gabriels during the late 1800's.
2. An observatory was established on Mt. Wilson in 1892.
3. The first extensive experiments in reforestation were begun by Theodore Lukens at Henninger Flats.
4. In 1892, the San Gabriel Timberland Reserve gave government protection to the mountain forest land.

BACKGROUND INFORMATION

One of the first pleasure trails built in the San Gabriels led to the summit of Mt. Wilson. The trail was constructed under the auspices of a rancher, Benjamin D. Wilson, who loved the waters and cool shade of Little Santa Anita Canyon.

As the towns throughout the Los Angeles Basin grew in size, the climb up Wilson's trail to the mountain's peak became a favorite with energetic hikers and horsemen. Two cabins which Wilson had repaired on the summit served as shelter for the men and women making the trek.

A full-fledged resort, complete with dining room and guest cottages, was opened on Mt. Wilson in 1890. Similar camping resorts were operated successfully on Echo Mountain, in Arroyo Seco and in Eaton Canyon, as well as in other cool, secluded canyons.

Passage into the mountains was limited to travel by foot and horseback until actual roads were constructed. One of the first was a toll road leading to Mt. Wilson. Entrepeneurs also constructed cable car routes leading into the mountains. These were eventually taken over and improved by the Pacific Electric Railway Company. Trolleys leading to the Echo Mountain resorts gave visitors excellent and exciting views of the valley floor below. The railways were maintained until the 1938 flood destroyed the tracks and the resorts.

The first observatory on Mt. Wilson was constructed in 1892. It was subsequently upgraded to a fully government supported operation in 1907. All of the materials for constructing the observatory and its telescropes were brought in by muleback and truck along the Mt. Wilson Toll Road.

From 1903 to 1906, some of the first studies concerning reforestation were carried out by Theodore Lukens at Henninger's Flats. Lukens was concerned about the adverse impact of forest fires started by humans on the slopes of the San Gabriels. He distributed information about his seeds and techniques throughout the world. This

BACKGROUND INFORMATION (Cont'd.)

work brought him the title of "Father of Forestry."

John Muir traveled through the San Gabriels in 1877. His writings, published after his exploration of these mountains, helped to establish the area as a National Forest.

The United States' first conservation act was enacted in 1891. It granted the President the authority to set aside forested lands as public reservations. In 1892, the San Gabriels Timberland Reserve was created through this act. It was the first forest reserve to be designated in California and only the second in the United States. In 1907, the reserve was renamed the San Gabriel National Forest--preserving the mountain wilderness for the enjoyment of the public.

CURRICULUM OBJECTIVES

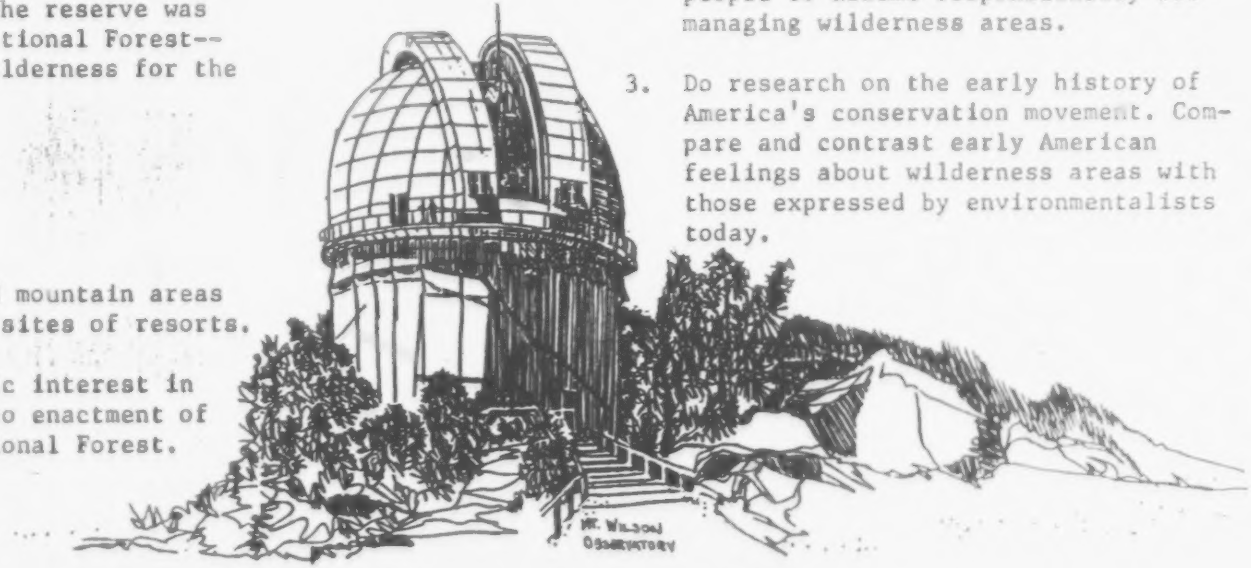
Students will be able to:

1. Identify canyons and mountain areas which were once the sites of resorts.
2. Recognize that public interest in the wilderness led to enactment of the San Gabriel National Forest.
3. Describe two events that made Mt. Wilson famous.
4. Describe the work of Theodore Lukens.

"DOING ACTIVITIES"

Students will be able to:

1. Hike to the top of Mt. Wilson and visit the observatory. After the hike, write a report describing the difficulties people in the early 1900's faced in constructing the observatory.
2. Visit reforestation projects in the San Gabriels. Discuss the need for people to assume responsibility for managing wilderness areas.
3. Do research on the early history of America's conservation movement. Compare and contrast early American feelings about wilderness areas with those expressed by environmentalists today.



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CONCEPTS

1. Students can learn to express themselves orally as a prelude to understanding written tasks.
2. The ability to relate clear-and-easy-to-follow directions is an important skill.
3. Storytelling is valuable as both a verbal skill and as entertainment.
4. Interpretation of information and verbalization are high-level skills.
5. Students should be able to relate their outdoor education experiences to other persons.

BACKGROUND INFORMATION

Storytelling is an important and exciting part of life. It helps to express our thoughts and feelings concerning the world. On the trail, it builds excitement and interest.

Students who have a difficult time writing and even talking in a classroom may find it much easier in the relaxed environment of the out-of-doors to share some of their experiences. When given the opportunity to create a story in the out-of-doors, many students find an imagination within them that they never knew existed.

Our pioneer ancestors told folk legends and stories as they sat around their campfires in the evening. The legends and stories were entertainment but also offered a means of understanding the environment. Stories can thus be used to explain our natural environment, to illustrate the relationships between people and their world, and to emphasize our values.

Through storytelling, people can give new interpretations to their experiences and can share them with others. Storytelling should be considered a "natural art" since people are constantly engaged in talking about things that have happened to them. A story, then, can simply be about something you saw happen and that you now wish to relate. Observe the world around you, look for the magic in it, and then share it at a campfire with the other hikers.

CURRICULUM OBJECTIVES

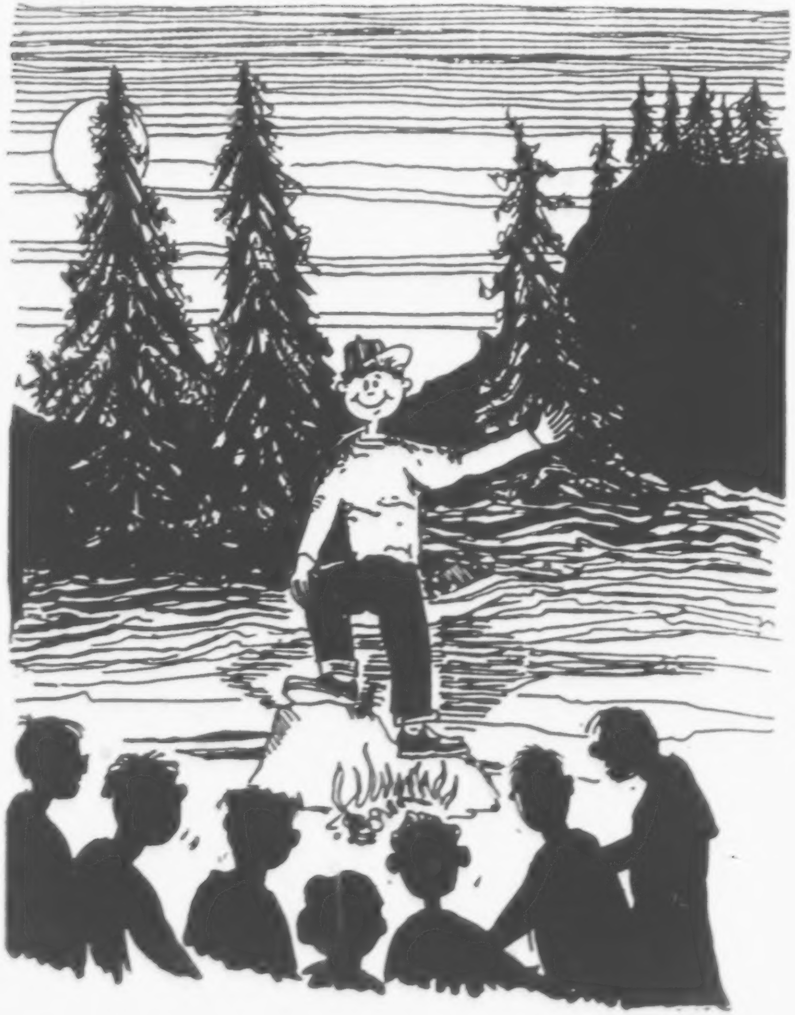
Students will be able to:

1. Participate in group storytelling activities.
2. Give directions/instructions in a clear, easily followed manner.
3. Demonstrate the ability to participate actively in discussions.

"DOING ACTIVITIES"

Students will be able to:

1. Create a story to explain a phenomenon observed on the trail to relate the history of the area. Stories may be based on fact or may be pure fantasy. They should be presented orally to the group.
2. Give directions for a simple trail-related task to another student in such a way that the student can perform the task as expected.
3. As a part of a group, create a story about the history of their group or about some phenomenon they witnessed together.
4. Verbalize their feelings by giving a fantasy interpretation of an ideal tree, animal, or flower in the specific environment of the trail.
5. By participating in a panel discussion, express their feelings and thoughts about a particular experience on the trail.



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CONCEPTS

1. Photo journalism is a means of telling a story through pictures.
2. Photography can be done with simple, inexpensive equipment.
3. A good photograph is balanced and focuses on one subject or theme.
4. A series of photos on an overall theme can be combined creatively to tell a story.

BACKGROUND INFORMATION

Photo journalism is a means of telling a story through pictures. It offers an opportunity for students to use some creative talents. First, the student must develop a story line. Second, he/she must seek out a site for the story. Third, he/she must organize the pictures in such a way as to tell the story.

Once the story line has been developed, the student should think about the individual elements which will make up the overall story. These elements can be considered as subject matter for the photographs. Each photograph should be concerned with a particular part of the story.

The student should use the camera's eye to create a feeling in each picture. The angle of the photo, the centering of the subject, and the lighting can all be used to bring out feelings of happiness, despair, seriousness, or tranquility. Experimentation with the camera will teach the student how to create the feeling that he/she is seeking to express.

After shooting and developing the photos, the student will select those which best illustrate the story. These can be mounted on art board for display. A short caption should accompany each picture. The captions should be written in a lively manner and should present information in addition to that provided in the photographs. By thinking of the pictures as a story sequence, the student can easily choose those photos which best illustrate the sequence and then write the captions for them.

The student may also use slide film on outdoor trips. The slides can then be edited and arranged in some sequence to illustrate a particular theme. Editing slides means to select those which best explain the theme. Slide shows can be held in the classroom to publicize the outdoor education experience. If slides are to be shown in a formal presentation, the student should also prepare a script ahead of time so that he/she can directly relate each picture to the theme.

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CURRICULUM OBJECTIVES

Students will be able to:

1. Prepare a photo essay around a specific theme suggested on an outdoor trip.
2. Shoot a photo that conveys a thought or theme and that needs no further explanation.
3. Prepare a picture story consisting of five to eight pictures and accompanying captions. The theme should be centered on some wilderness experience.
4. Prepare a slide presentation on some aspect of outdoor education or trip preparation.
5. Prepare a slide presentation on some other aspects of the school's backpacking activity.

"DOING ACTIVITIES"

Students will be able to:

1. Shoot pictures that are an interpretation of several specific out-of-doors themes. The photos will be edited by the students into group essays centered on the theme selected.
2. Shoot photos that attempt to relate a self-contained thought or theme. Students may select individual themes or group themes.
3. Shoot five to eight pictures that tell a story on a selected aspect of a wilderness experience.
4. Plan, assemble, and edit a slide presentation on some specific aspect of backpacking, such as how to load a pack.
5. Assemble and edit a slide presentation on the backpacking activity at the school. The presentation should be arranged to explain either why the activity exists or what it is.
6. Shoot and assemble pictures of their backpacking experience. The best photos may be mounted for display at school.

"FATHER BEAR AND.........

CONCEPTS

1. Periodic observations expressed in writing help interpret a wilderness experience after its completion.
2. Impressions of an experience change with time, and a written record helps to identify these changes.
3. Attempting to verbalize feelings, observations, etc. is often easier if the person seeks to record them.
4. The orderly recording of data is important, and making entries in a log is an efficient method of doing so.
5. An accurate log of an outing will help to avoid problems when planning for future trips.

BACKGROUND INFORMATION

Logs and journals can be maintained on hiking trips to provide written records of thoughts and reactions to situations as well as specific data. A log is used when you have certain, identifiable records that you wish to keep. If you are going on your first backpacking trip, you may wish to maintain a log on the trip's day-to-day routine. For example, you may begin by noting at what time the trip actually got underway as opposed to when it was scheduled for departure. You may also wish to keep a record of how much food is eaten at each meal; what items on the menu were especially well-liked and which ones could be left behind. Perhaps you will think of a particular piece of equipment that would be useful on your next hike. This, too, could be jotted down.

Logs can also be combined with certain science projects. You may be interested in keeping track of the weather, observing the path of the sun, or noting an animal that you saw and its type of environment.

Journals differ from logs in that they are more personal interpretations of a given event. In a log, you merely record an observed fact. In a journal, you record your feelings and thoughts about your observations.

Journal entries should not be formal essays. Rather, they may consist of a series of non-related entries describing events or observations. As you walk along the trail, think about how you are reacting to your backpack, the weight you are carrying, and the steepness of the trail. When you come to a rest stop, take out your note pad and write down those feelings. What does it feel like to stop? Is the walk enjoyable? What thoughts pass through your mind as you hike? What did you think about to get yourself up the steepest part of the trail? Be curious about yourself and your interaction with nature. Question what is happening to you in the wilderness and record these thoughts.

BACKGROUND INFORMATION (Cont'd.)

Evenings are also a good time for sitting down and writing journal entries. Look back through the day for one or two events which really impressed you. Then think about why they impressed you, and write down your evaluation. Journals should not be mere lists of diary-type entries, but should contain your own personal reaction to and your interpretation of the world around you.

CURRICULUM OBJECTIVES

Students will be able to:

1. Keep a journal in which they record their observations, feelings, impressions, etc., at specific intervals.
2. Develop written communication skills by recording cohesive evaluations, descriptions, and interpretations in their journals.
3. Keep a log for a particular outing in which they record specific data.
4. Develop techniques for designing a log to record data for a specific purpose.

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"DOING ACTIVITIES"

Students will be able to:

1. Keep a daily journal during an outing, recording observations, feelings, descriptions of events, etc., at least once a day.
2. Maintain a log book during an outing to record data that will aid in the evaluation of the trip and in future planning. Possible entries may include descriptions of equipment failures, trail irregularities, menus, etc.
3. Prepare a log to be kept for a specific purpose, such as to record observations on the weather.
4. On a strenuous day hike, keep an hourly journal to record observations on their physical condition and mental outlook.

WHEN WE SPOKE OF PREPARING A LOG, I DIDN'T THINK IT WOULD BE TAKEN LITERARILY ?!

CONCEPTS

1. Different forms of creative writing can be easily incorporated into a wilderness experience.
2. Attempting to explain unusual phenomenon provides an excellent medium for creative writing.
3. All writing depends on sensory stimuli and interpretations of them.
4. Writing should have both a clearly discerned purpose and a clearly defined audience.
5. The wilderness experience has always been a major subject for poetic expression.

BACKGROUND INFORMATION

All writing that is not directly copied from another source is creative. Engaging in different forms of creative writing can help to intensify and personalize a person's wilderness experiences. Backpacking is an adventure--an escape, in one sense, from the typical routines of urban existence. With a sense of adventure comes a heightened feeling of awareness, a realization that you are entering and experiencing a new world. Through writing stories, poems, or essays to record feelings of adventure and awareness, you can make the wilderness experience intensely personal experience and can share it with others.

Good writing depends on the writer's ability to create a realistic scene. Think for a moment about the world around you and the elements which go into its make up. What do the sounds tell you? Look carefully at the detail in the scene around you. What colors edge the sky? How many shades of green do you see? What details do you see in the bark of a Jeffrey pine? Try to imagine the feeling of touching the wilderness. What textures, shapes, and forms would you give it?

Before selecting a story, poem, or essay to write, think carefully about the audience for whom you will be writing. Will it be your classmates, a younger group, or an older audience? What will your audience want to know about your experiences? What do they already know?

Subjects for stories are easily at hand in the wilderness. You may watch for a particularly humorous event which occurs on the trail and use that as your central subject. Or you may choose to use your imagination to explore and explain some natural phenomenon that you have observed. Since you are out in the woods, try imagining a suitable adventure for the setting. What would happen if you and your classmates encountered an old prospector or an Indian still

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BACKGROUND INFORMATION (Cont'd.)

living in the forest?

Poetic expression easily lends itself to the sensual imagery of the natural world. An easily learned form of poetry is the Haiku, a traditional form of Japanese verse. Haikus are composed of three short lines of five, seven, and five syllables:

____________________ (5 syllables)

____________________ (7 syllables)

____________________ (5 syllables)

The Haiku is particularly adapted to conveying atmosphere, mood, and feelings in a concise yet sensitive way. Samples of Haiku can be found in almost all collections of modern poetry. Copy a few examples to take with you and use them as models. Here is one example:

High above coyotes
Howling at the yellow moon,
Stars passing overhead.

Another type of poem may be written using this formula:

First line: A noun.
Second line: Two words that describe the noun.
Third line: Three action words about the noun. These can end in "ing."
Fourth line: A phrase about the noun.
Fifth line: Repetition of first line.

Example:

Ants
Tiny, strong
Carrying, storing, working
They are great backpackers
Ants.

CURRICULUM OBJECTIVES

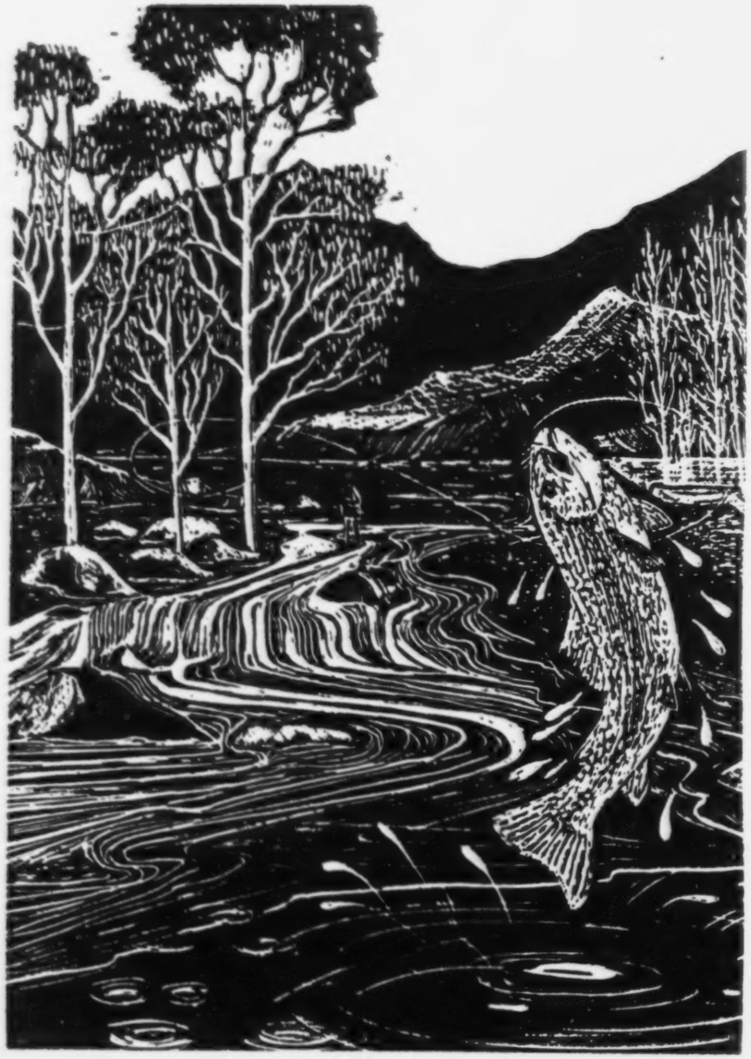
Students will be able to:

1. Write one paragraph describing an environmental situation based on a limited observation of the situation and using only one sense (i.e., hearing, smelling, seeing, etc.).
2. Write an expository/analytical essay describing a specific natural process observed during a wilderness experience.
3. Write a short story based on some specific setting, event, or situation encountered on an outing.
4. Compose a Haiku poem based on their observations of a specific natural situation.

"DOING ACTIVITIES"

Students will be able to:

1. Write paragraphs interpreting the natural world through one of the five senses.
2. Write essays analyzing a particular natural process (e.g., erosion, photosynthesis, sunrise).
3. Write short stories individually or in groups. Inspiration should come from the day's backpacking encounters.
4. Study free-form Haiku poetry and then attempt to write a Haiku poem or poems of your own.



"FISHING, A FUN DAY!"

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CONCEPTS

1. Sketching pictures of the natural environment requires careful observation of detail.
2. A sense of the natural environment can be readily conveyed by using natural materials in pictures, collages, and mobiles.
3. Pictures may be based on fantasy to illustrate a particular theme or message.

BACKGROUND INFORMATION

The colors, textures, and shapes of the natural environment have been inspirational to artists for centuries. Landscape painting and drawing are traditions in their own right. Yet to convey fully the feeling and mood of a particular setting requires a careful eye and a thorough study of the area.

Scenes with simple compositions are best for beginning artists. A sense of balance should be strived for, and some feeling for the environment should be expressed.

To develop an awareness of detail, sketches can be made of different varieties of trees. Careful attention should be paid to differences in bark texture, the arrangement of needles, and the size and shape of cones.

Collages can be readily made from bits of natural materials found on the forest floor. Successful collages usually are centered on a theme that the artist wishes to express. Materials are then selected which will best convey the feeling behind the theme. Mobiles can also be constructed from natural materials.

Paintings may be given added interest and dimension by including materials from the environment. Students should experiment with different art forms by including bits of the natural environment to express their wilderness experience.

CURRICULUM OBJECTIVES

Students will be able to:

1. Sketch a scene from a normal perspective.
2. Create a collage using natural materials.
3. Create a pictorial message depicting an interpretation of the wilderness.
4. Sketch a representative plant or animal for a particular environment.
5. Draw sketches of trees or of an interesting shrub encountered on the trail.

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"DOING ACTIVITIES"

Students will be able to:

1. Make a charcoal or pen sketch of a particular scene.
2. Collect a variety of natural materials (grasses, twigs, bits of bark) and create a collage or mobile.
3. Use symbols or natural materials to create a picture with a message that expresses student feelings toward the out-of-doors.
4. Discuss what an ideal plant or animal would be like for the particular environment. Then individually sketch one of their own creation.
5. Sketch several varieties of trees observed on the trail from different perspectives.
6. Draw a picture with something that they find in the out-of-doors. It may be a piece of burnt twig, "juicy grass," dirt, charcoal from a campfire, berries, or a soft rock.
7. Make a mobile to depict camping activities or animals of the San Gabriels. Students may use photos from magazines mounted on lightweight cardboard and covered with a thin, watery, white glue.

OH, THAT'S WHAT WAS IN HIS BACKPACK!

CAMPING SKILLS

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CONCEPTS

1. Some campsites are more desirable than others.
2. Level ground is the most important single consideration in campsite selection.
3. Campsites should be evaluated for possible safety hazards.
4. Proper drainage of the campsite is important if rain is threatening.

BACKGROUND INFORMATION

Campsite selection is important if the group is to spend a comfortable, restful night. There are a few rules to follow in choosing a site that will assure a good night's sleep.

Look for these characteristics:

- Level ground.
- Shelter from wind and rain.
- Eastern exposure.
- Absence of dead trees overhead.
- Easy access to water.

These same rules will apply whether students are camping individually or in a group.

Level ground is important for a good night's sleep. Avoid humps and bumps that would put your tent and your body on two different planes.

If you do have to sleep on a slope, place your feet downhill. It is very difficult to sleep if your head is pointing down a slope.

Shelter from wind and rain may come from natural sources, which deflect the elements. Look for small clumps of trees or bushes or an overhanging rock ledge.

If you camp where the sun's first rays will hit you in the morning, any dew or frost on your tent or sleeping bag will dry off quickly. Be sure to avoid camping under dead trees or trees with dead limbs which might fall off and hit you. Look for locations close to a good water source. Meadows and riverbanks are attractive campsites, but they will be cold and damp. Your best best is camping in dry duff some distance from the water.

If rain is expected, pitch your tent on very level ground and stow your gear safely inside. Be very careful during stormy weather not to camp in dry river beds. Flash floods can occur very suddenly.

While group camping, be sure to select sufficient level ground area to accommodate everyone. Make an effort to see that both group needs and individual privacy are considered.

CURRICULUM OBJECTIVES

Students will be able to:

1. Evaluate campsites to determine which best meets their needs.
2. Identify and avoid possible safety hazards.
3. Establish a comfortable sleeping site without undue disturbance to the area.
4. Determine if the site will be as suitable in a rainstorm as it is in dry weather.

"DOING ACTIVITIES"

Students will be able to:

1. Examine four campsites and determine which is the best and why. Students may work individually and then compare results.
2. Identify two areas that would be unsuitable for camping and explain why?
3. Select a campsite for a party of two, and then select another site for a group of 20. Discuss the needs of group camping.
4. Prepare a campsite with another student. In the morning, return the campsite to its natural condition.
5. In a group, discuss the particular factors which should be considered when selecting a site in rainy or windy weather.
6. Use a contour map of the area to determine possible campsites. Or select campsites from a teacher-prepared map of an area that includes a number of potential hazards. In either case, students should discuss the good/bad points of each location.

HOLD IT!
HERE IS A GREAT SITE!
SOUNDS GOOD
HOW TO FIND THAT GOOD CAMPSITE
DO'S
DONT'S

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CONCEPTS

1. Camp wastes must be properly disposed of to avoid environmental contamination and health hazards.

2. Human products (i.e., trash that cannot be burned) may take centuries to decompose and should be packed out.

3. Garbage attracts animals. This can be harmful to both animals and humans.

4. Personal cleanliness on the trail will contribute to a healthy body.

BACKGROUND INFORMATION

Campsites should be kept clean of all garbage and other wastes. This is important for the health of the group and for the beauty and quality of the environment.

In general, campers who keep a clean camp are less troubled by animals than those who allow garbage to collect.

When a campsite is without a privy, a pit toilet should be constructed. This should be downwind from the campsite, located well away from traveled paths, and at least 200 feet from any still or running water. It is important that the latrine be carefully placed in order not to contaminate the water system and to avoid an odor problem.

Washing water for dishes should be heated first to kill possible bacteria. Campers should use a biodegradable soap and perform all washing activities well away from any water source. Dirt or clean sand may be used for scouring the outside of pots and pans.

Food wrappers and other papers should be collected and burned if a fire is permitted. Otherwise, they should be packed out. Foil, tin cans, plastic, and any aluminum or metal wastes must be packed out as well.

Personal hygiene must not be overlooked. Following a day's backpacking activities, each camper should be sure to wash his/her feet. Clean, dry feet and clean socks help prevent the formation of blisters. A freshly washed face, feet, and chest help to revive tired spirits. Again, all washing must be performed away from primary water sources. For personal washing up, campers should collect water in a pan or bucket and carry it a good 200 feet away from the water source. Biodegradable body soaps are available in backpacking stores and are preferable for use in wilderness areas.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate the importance of proper disposal of camp wastes, including garbage and dishwater.

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CURRICULUM OBJECTIVES (Cont'd.)

2. Demonstrate good personal hygiene practices.

3. Give three reasons why campsites should be kept clean.

4. Describe two methods of reducing backpacking waste.

"DOING ACTIVITIES"

Students will be able to:

1. Dispose of camp wastes properly, either by disposal at the site or removal from the site.

2. In conjunction with meal preparation, demonstrate correct procedures for washing and cleaning of camping utensils.

3. Discuss society's tendency to produce waste. Small groups may work together to devise ways of reducing waste in the camp and in the city.

4. Along the trail, at streams, and in campground, gather litter and trash left by other campers. A special trash sack may be brought along for this purpose.

5. On the last day of the trip, collect trash left by others along the trail and pack it out.

"PACK IT OUT!"... I'LL BE LUCKY TO JUST BALANCE IT OUT!!

CONCEPTS

1. Local fire regulations must be strictly adhered to for campers safety.
2. A fire of any kind is a potential hazard.
3. Campfires and cook stoves should be situated at safe locations, away from combustible materials.
4. Campfires and cook stoves should never be left unattended.
5. When a campfire or stove is not needed, it should be extinguished.

BACKGROUND INFORMATION

Before setting out on any hike, campers should find out from local Forest Service authorities what the fire regulations are for the area in which they plan to camp. There is a growing tendency in wilderness management to limit campers to cook stoves only. For both campfires and camp stoves, you may be required to obtain a permit.

If students are taking a camp stove, they should spend some time in becoming familiar with it before the hike begins. They should know how to add fuel to the stove or how to change its fuel cartridge as well as how to light and extinguish it.

Whether students build a campfire or use a cook stove, they must locate it well away from combustible materials, such as brush, grasses, or overhanging tree limbs.

Also, they should check the direction of the wind and place the stove or fire upwind of camp. Often a large rock or boulder can serve as a wind break.

Portable cook stoves should be used with as much care as a regular campfire. Because such stoves use some type of liquid fuel, there is always the potential of an explosion.

If using a white gas stove, campers must never spill gas near the flame. White gas ignites very easily. In addition, the fuel tank of a white gas stove must never be allowed to overheat. Overheating causes pressure inside to build to dangerous levels and could cause an explosion. If campers run out of fuel while cooking, they must let the burner grow cool enough to touch before adding more fuel.

These same general rules apply to kerosene and butane stoves. Butane stoves must be treated with added care when they are refueled. After a new cartridge has been attached, the camper should lister carefully for any continuing hissing sound. Such a sound could indicate a leak or a problem with a fuel line. If this occurs, the camper should discard the cartridge

BACKGROUND INFORMATION (Cont'd.)

and try again. All cartridges, empty or full, should be packed out.

Students must always stay with their camp stove when it is in use. It must never be left unattended. Camp stoves should not be used in a tent unless the camper is absolutely certain of how to operate them in such confined, potentially dangerous situations.

If campfires are permitted, student should use fire rings which have been constructed by previous campers. Only dead and fallen braches, tree limbs, twigs, etc., should be used as fuel. Students should never cut a living tree, shrub, or bush for a fire.

Campfires should be small for safety reasons and to conserve wood.

When finished with the fire, students should extinguish it with a good dousing of water, stir the ashes, and then douse it again. They must be sure that the fire or stove is DEAD OUT.

CURRICULUM OBJECTIVES

Students will be able to:

1. Determine what fire regulations pertain to the proposed backpacking area.
2. Choose and prepare a safe fireplace for either a campfire or camp stove.
3. Start and extinguish a campfire or camp stove properly.

"DOING ACTIVITIES"

Students will be able to:

1. Consult the appropriate U.S. Forest Service station for information on fire regulations,
2. Select a proper area within the campsite for a fireplace.
3. Build and start a small cooking fire or start a camp stove properly. They should extinguish the fire or stove after using it.
4. Discuss the importance of campfire regulations in mountains as susceptible to burning as are the San Gabriels.

THIS IS A SMALL COOKING FIRE?
DINNER BY CANDLE LIGHT, GREAT!

CONCEPTS

1. In the selection of a campsite, it is necessary to consider adequacy of a water supply.
2. Wilderness water sources can be damaged if improperly used.
3. Precautions must be taken if the potability of the water is in question.

BACKGROUND INFORMATION

When selecting a campsite, be sure to examine carefully the available water supply.

In some permanent campsites, you will find a faucet already installed that will supply plenty of water. But, in true wilderness areas, you must rely on the water from a spring, a creek, or a lake.

Because campers tend to associate words like "pristine" and "sparkling clean" with the mountains, they may be inclined to drink water from any mountain source. However, in view of the extend of human activity in most mountain areas, it is much wiser to purify the water before you consume it. This rule applies to cooking as well as drinking water.

Water which lies in still ponds, may contain algae or silt and other impurities and may be dangerous to drink. Even flowing mountain river water may contain harmful bacteria. Therefore, it is wisest and safest to treat all wilderness water for impurities.

Boiling water will kill all harmful bacteria, viruses, and parasites. At elevations of 5,000 feet or below, it is sufficient to boil water for 10 minutes. Higher elevations require boiling water for 15 or 20 minutes.

Where it is inconvenient to boil water, the student may drop a Halazone tablet into his/her canteen. The water should stand for at least half an hour before drinking. If the chlorine taste bothers him/her, the student should shake the canteen vigorously and let the water stand a while with the cap off or mix the water with a fruit drink to disguise the chlorine.

To remove silt or other visible matter from the water, a filter may be necessary. The camper may use a cloth or paper towel filter or purchase a water purification device.

Campsites may be near a water source, but campers must do all cleaning and washing at least 200 feet away. Latrines should also be located far enough away from the water so that pollution from seepage does not occur.

CURRICULUM OBJECTIVES

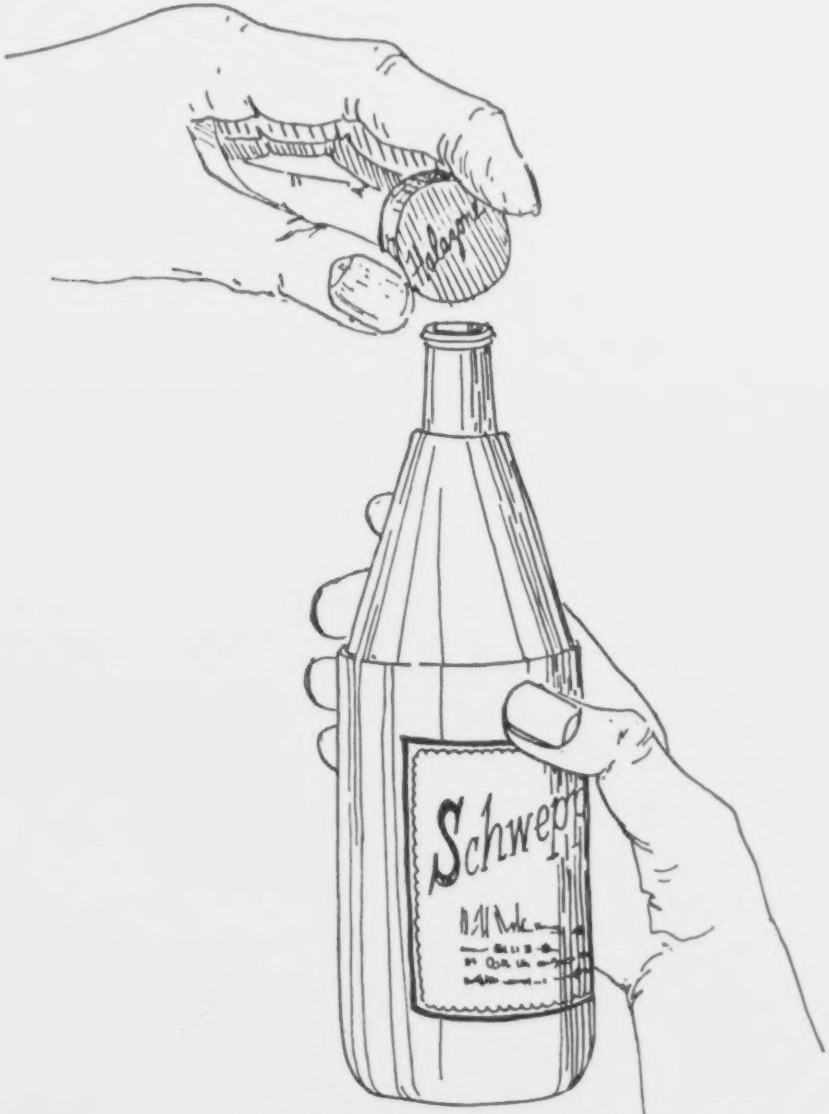
Students will be able to:

1. Recognize environmental signs indicating the potability of a water supply.
2. Determine if water needs to be treated prior to its intended use.
3. Process water with proper treatment so that it may be used without danger.

"DOING ACTIVITIES"

Students will be able to:

1. During a hike, locate a natural water source and evaluate the water to determine its quality.
2. Work in groups of two to treat water so that it may be used.
3. List the number of uses of water when camping. Is the available water supply sufficient to meet these needs? What uses could be eliminated if there was a need to conserve water?



"THAT'S MOST INTERESTING: THE NECK IS TOO SMALL FOR THE TABLET OR IS THE TABLET TOO BIG FOR THE BOTTLE'S NECK."

CONCEPTS

1. Camp should be set up in the early afternoon.
2. Latrine areas should be built first.
3. Tents may not be needed if the weather is fair.
4. The kitchen should be centrally located.
5. Hikers should clean up the camp before they leave and make certain that any fires are "dead out."

BACKGROUND INFORMATION

By reaching camp in the early afternoon, students will have more time for arranging the site, cooking a good meal, and enjoying other outdoor activities.

Once you arrive at a suitable site, determine where your sleeping, kitchen, and latrine areas will be.

If a latrine needs to be constructed, it should be set up first so that the campers know where it is and that it is available.

Kitchen and sleeping areas are usually situated close together. The latrine should be a good distance from both.

If the weather is fair, you many not want a tent to separate you from the evening stars. So simply roll out your plastic tarp or tube tent and place your ensolite pad and sleeping bag on top of it.

If your bag is filled with down, be sure to spend some time fluffing it up to distribute the down evenly and increase its loft. This procedure will fill the down with air pockets that will keep you warm.

If a tent is required, set it up according to the directions. You should first experiment with it at home so that you are familiar with the process before you arrive in the wilderness.

The kitchen usually is located in the center of camp, and its focal point is the campfire or cook stove. Cooking utensils and the night's meal should be brought together. Water should be carried to the kitchen area for both cooking and cleaning purposes.

Before going to sleep, campers should store their foods securely in their packs or hang the foods in sacks in nearby trees. This procedure should discourage mice, squirrels, and other animals from inviting themselves to feast on your food supply.

When you cook meals, be sure to separate waste items that may be burned from those which must be carried out. In areas where

BACKGROUND INFORMATION (Cont'd.)

campfires are permitted, be sure to carry out all waste items that cannot be burned.

When you are ready to break camp, make sure that nothing has been left behind; that all waster materials are being packed out; that the latrine has been buried; and that the campfire is DEAD OUT. Leave the area in a better condition than what it was when you arrived.

CURRICULUM OBJECTIVES

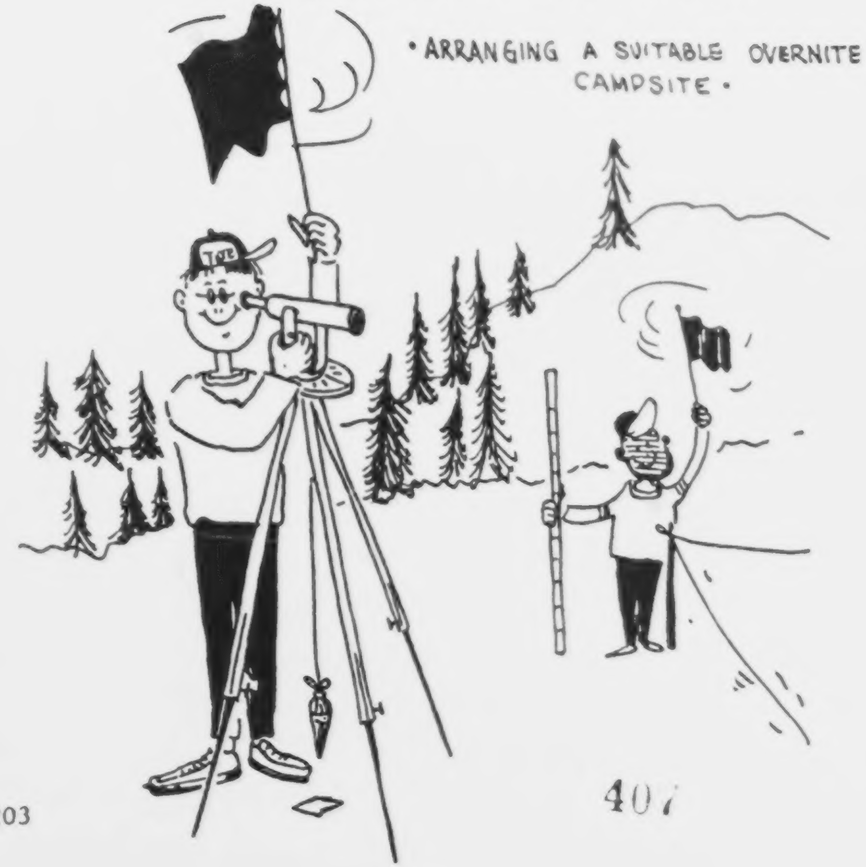
Students will be able to:

1. Arrange a suitable campsite for camping activities.
2. Make up their beds.
3. Store food and other supplies properly.
4. Leave the campsite in a better condition than it was when they arrived.

"DOING ACTIVITIES"

Students will be able to:

1. If, necessary, construct a latrine.
2. Divide the camp into sleeping, cooking, and sanitation areas.
3. Prepare the sleeping area.
4. Cook dinner, being careful to accumulate waste materials, and to store food for the night.
5. Spend 15 minutes in the morning to walk over the campsite and to collect litter and other waste materials.



•ARRANGING A SUITABLE OVERNITE CAMPSITE•

CONCEPTS

1. Backpacking gear may be divided into two categories: (a) personal items; and (b) community property.
2. To assure that important items are not overlooked, campers should prepare a list of articles that will be needed on the backpacking trip.

BACKGROUND INFORMATION

The equipment you bring on a backpacking trip will be all you have while in the wilderness. You want to be sure that you have all the necessities plus items that offer some comfort and enjoyment. But you also want your pack to be light enough so that you will enjoy the hike.

Preparing a checklist of the items you are planning to bring helps assure that you won't forget anything important.

As you participate in more backpacking trips, your list will become more and more refined. Items taken on your first trip may be omitted on subsequent trips. Finding out the right amount of equipment to carry is largely a matter of experience and personal preference.

When you are backpacking with a group, your list should contain items of both personal and community property. It is worthwhile to note on your list what belongs to you and what belongs to the group so as to avoid confusion.

It is simply not possible to produce an equipment list which covers every type of backpacking. However, a recommended list of items for an overnight hike would include:

Frame backpack
Sleeping bag and stuff bag (Line the stuff bag with a garbage sack to keep your sleeping bag dry in wet weather.)
Tent
Plastic tarp (not needed if using a tube tent)
Ensolite or osolite pad
Quart water bottle
Clothing
- Sturdy hiking boots with lug soles and which are high enough to cover the ankles
- Hiking shorts
- Long pants
- Change of underwear
- 2 sets of outer socks
- 2 sets of inner socks
- Cotton T-shirt
- Knit cap
- Shade hat
- Warm jacket
- Rain poncho
- Sunglasses

Personal items
- Toothbrush and paste
- Biodegradable soap

BACKGROUND INFORMATION (Cont'd.)

- Toilet paper
- Lip balm
- Suncream
- Feminine hygiene

Kitchen and tools (personal)
- Flashlight
- Spare batteries, bulb
- Matches and waterproof match case
- Metal cup, plate
- Eating utensils

Kitchen (group)
- Stove
- Fuel can
- Cooking pots
- Gripper or handkerchief, pot holder
- Stirring spoons
- Biodegradable soap
- Scrubber
- Grill (not required if fire stoves are available or if fires are not permitted)

Food (group)
- Meals for each day, plus emergency rations

First aid kit (group)

Miscellaneous items (group)
- Maps
- Compass

Optional items (personal)
- Notebook, pencils
- Camera, film
- Natural history guides
- Harmonica, recorder, or other instrument

This list may be added to and changed as needed, depending on how long the trip will be, where you are going, what weather conditions you expect, and personal preference.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate a knowledge of necessary backpacking equipment.
2. Develop personal and group equipment lists.

"DOING ACTIVITIES"

Students will be able to:

1. Prior to going on the trip, prepare with the group a detailed list of necessary equipment.
2. Work alone to develop a list of personal backpacking gear and compare it with items of at least two other persons in the group.
3. Collect equipment and check off each item on personal and group lists.
4. In a group discussion, draw parallels between what equipment is required in the city and what equipment is needed in the wilderness.
5. Devise more than one way to use any equipment item; e.g.; how many ways can they think of to use a safety pin, aluminum foil, and a plastic garbage sack.

CONCEPTS

1. Before students pack their packs, they should assemble all gear in one place and have it checked by the leader.
2. To make it easier to decide where to put all the gear, students should divide it into obvious categories. Thus, all food would go in one pile, all clothes in another, etc.
3. Three factors will help students in determining what to pack: (a) the weight of each item; (b) when and how often each item will be needed; and (c) whether the item requires special attention.

BACKGROUND INFORMATION

A backpack has a certain order built into it. Learning how to take full advantage of this order is part of learning how to be a successful and happy backpacker.

First, assemble the gear on your list, checking off each item as you collect it. You may wish to toss the items in a large box as you review the list.

Second, divide the items into smaller groups. Many of these things suggest a natural order. For example, keep all kitchen utensils together. Separate your personal items from group items. Foods may be segregated according to days or according to their type (i.e., all dinners in one group, lunches in another, etc.).

Stuff bags which are labelled as to their contents make it easy to find what you want when you're on the trail.

Separate the clothing you will be wearing during the hike from what must be packed.

Many newly designed backpacks have two major compartments and additional storage pockets sewn on the outside. To help you decide where to store the gear that you have collected, consider the following:

1. Distribution of weight. The heaviest items should be placed at the top of the pack and as close to the frame as possible. This procedure will place most of the weight on the hip belt and prevent the pack from dragging on the shoulder straps. Strap the sleeping bag at the bottom of the pack. However, if the bag is one of the heavier items, place it at the top of the pack. Other items should be evenly divided according to weight between the two sides of the pack. A full pack for students should not exceed more than 1/5 of their body weight.
2. Items you will need most often or at critical times. All gear that you

BACKGROUND INFORMATION (Cont'd.)

need quick access to should be located where you can easily find it. Having to dig through a pack to find that vital first aid kit reflects poor planning. Use the outer compartments of the pack for such items as water, sun cream, sunglasses, camera and film, first aid kit, and insect repellent. If it looks like rain, do not place your poncho at the botton of the pack.

3. Special problems. For example, do not pack stove fuel and food together. A leak in the fuel supply could poison the food without your knowledge.

The group leader should verify that each student has brought the required items. This will eliminate potential discomfort and possible danger on the trail. Each camper should show his/her sleeping bag, jacket, change of socks, rain poncho, hat, eating utensils, and other necessary items. Repeatedly, the importance of being prepared in the wilderness should be emphasized All that you need must be in your backpack.

CURRICULUM OBJECTIVES

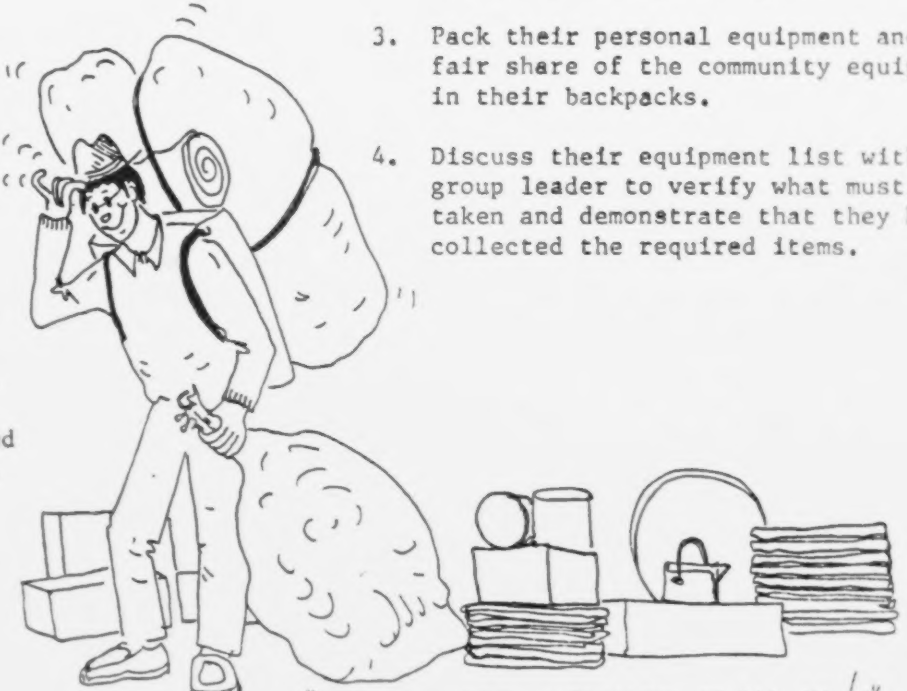
Students will be able to:

1. Pack a backpack properly with personnel and community gear.
2. Demonstrate to the group leader that they have properly packed all required items.

"DOING ACTIVITIES"

Students will be able to:

1. Assemble their required gear for packing.
2. Arrange the community equipment needed in appropriate groupings.
3. Pack their personal equipment and a fair share of the community equipment in their backpacks.
4. Discuss their equipment list with the group leader to verify what must be taken and demonstrate that they have collected the required items.



"GEE WHEEZ, I PACKED IT ALL IN!"

CONCEPTS

1. General considerations in selecting items for backpacking include:
   - The area in which you plan to hike
   - The season of the year
   - Anticipated weather conditions
   - The durability and comfort of the equipment
2. Essential backpacking equipment includes:
   - Hiking boots
   - Backpack
   - Sleeping bag
   - Tent
   - Outdoor clothing

BACKGROUND INFORMATION

The increasing numbers of people who are backpacking has spurred the rapid growth of the backpacking and mountaineering supply industries. A glance through any manufacturer's catalog will start your head spinning because of the amount and variety of equipment which is available. How do you choose amoung five levels of sleeping bags and that endless array of boots, pack frames, and backpacks?

To begin with, do not let the variety overwhelm you. These guidelines can help you in the selection of equipmeht:

1. Evaluate how you plan to use the equipment.
2. Draw up a list of criteria which your equipment items should meet.
3. Consider the area in which you plan to hike.
4. Consider the weather conditions you are most likely to encounter.
5. Select equipment which is both comfortable and durable.
6. Consider the cost. For beginning backpackers, inexpensive or used equipment is satisfactory.

The starting point for any hiking excursion is the selection of a sturdy pair of boots. Because your feet are going to carry you to and from the wilderness, be sure to select boots that provide your feet with the protection they deserve.

Tennis shoes do not provide sufficient support or protection for a backpacking trek. Running shoes with lug soles may be adequate for short trips in the San Gabriels. But leather boots with lug soles that grip the ground are usually the best footwear for backpacking. The boots should come up

BACKGROUND INFORMATION (Cont'd.)

over the ankle to support your weight and to provide protection from thorny bushes and possible snakes. For most backpacking excursions, boots can be fairly lightweight. Heavier mountaineering boots will only add more weight and be harder on your feet. Heavy boots are really designed for full-fledged expeditions.

The backpack is what makes it possible to extend a day hike into an overnight or even a mounth's excursion. Since it is an item you will be wearing everyday, be sure it fits comfotably when packed full. Both frame packs and soft packs are available; the choice depends on what is most suitable for your needs.

Sleeping bags should provide the warmth you need at night in the cold mountains. A three-season bag can be expected to keep you warm enough from spring to fall. A typical bag of this type weighs about four pounds and keeps you warm even when the temperature is only 15 or 20 degrees. Your major decision will be to choose between selecting a bag filled with goose down or one filled with synthetic fibers. Down is more expensive than the synthetic filled bags, but down is also warmer in small amounts. Synthetic bags thus are bulkier than down bags of equivalent warmth. However, synthetic bags are safer in rainy weather. They do not absorb water as readily as down bags do, and they can be wrung out and dried quickly. If a down bag becomes wet, it loses both its loft and its warmth, and there is little you can do to dry the down.

In the San Gabriels (as well as in most California mountains), a simple plastic tube tent will usually provide enough shelter during the spring, summer, and fall. Winter hikes and hikes in other wet ranges will require a sturdy tent with a rain fly. Tents should have mosquite netting and good ventilation.

The selection of clothing also primarily depends on the weather you will encounter. For day hikes in the San Gabriels, cotton T-shirts and hiking shorts are usually adequate. At night, a warm jacket and long pants will be necessary. In wet climates, both wool shirts and rain parkas or ponchos are necessary. In all mountain hiking, shade hats are necessary during the day, and a wool cap or jacket hood is needed during the cool nights.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe types of backpacking equipment used for dry and wet climates.
2. List two reasons why backpacking equipment must be both durable and comfortable.

"DOING ACTIVITIES"

Students will be able to:

1. Discuss the type of trip they will be making and the type of equipment necessary for the hike.
2. In a short written report (or orally) evaluate their own equipment in relation to backpacking in the San Gabriels.
3. Draw pictures, take photos, write a poem or an essay about the need for durable, comfortable equipment.

CONDO
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CONCEPTS

1. The purpose of first aid is not to provide a cure but to stabilize a situation, to make the victim as comfortable as possible, and to seek help.
2. Four methods are used to stop severe bleeding.
3. A non-professional should not try to set a broken limb.
4. Wounds with objects sticking out of them should be left that way.
5. The tourniquet should only be used for severe life-threatening hemorrhages.
6. Shocks symptoms can cause death if not treated properly.
7. A victim should never be moved unless it is necessary for safety reasons.

BACKGROUND INFORMATION

As a backpacker, a person never knows when emergencies will arise. Above all stay calm; for, in those first few minutes after an accident, the decision you make may be responsible for saving a person's life. Your decisions and actions will vary according to the circumstances. Sometimes, prompt action is necessary. At other time, there is no need to hurry.

When a victim is found on the trail, use the following procedures to determine the extent of injuries:

1. Do not move a victim unless it is necessary for safety reasons.
2. Check the victim for breathing and heartbeat.
    a. Breathing can be checked by listening; by watching for movement of the chest; or, if breathing is very slight, by holding a mirror or a pair of glasses up to the nostrils to note any fogging.
    b. The pulse can be taken at the carotid artery at the side of the neck.
3. Check for severe bleeding. Four methods can be used to stop bleeding.
    a. Direct pressure can be applied to the wound with a sterile bandage. Use bare hand in emergencies.
    b. Elevate the injured part of the body above the level of the victim's heart.

BACKGROUND INFORMATION (Cont'd.)

c. If bleeding still doesn't stop, use the pressure point technique. If this technique is required, do not substitute this procedure for the first two. It should be performed in addition to a. and b.

d. Use a tourniquet. This devise should be used only for severe, life threatening hemorrhages. The decision to apply a tourniquet may be, in reality, sacrificing a limb to save a life. Once a tourniquet has been applied, do not loosen it except on the advice of a physician.

4. Avoid chilling by using blankets or whatever is available to cover the victim.

5. Look for medical identification which may produce a clue to the victim's condition.

6. Check for a break or sprain. Do not try to set the limb. Try to immobilize the victim by using a branch or tent pole or even by binding the leg which is injured to the other leg or to the body. Treat all sprains as a break. Brace above and below the break. Clothes, including shirts, can be used as binders. If it is available use snow or water from a stream to keep the break cool to reduce swelling.

7. Leave puncture wounds with objects sticking out in place. Apply pressure around the wound to stop bleeding and apply the dressing around the object.

8. If the victim is unconscious, check for a head injury or stroke and try the pupillary reaction test. This is to check the size of the pupil.

9. Check contusions and scrapes thoroughly and apply dressings. Such injuries should be checked constantly for infection.

During the administration of first aid, the severity of the injury should be assessed. If a rescue squad is needed, two people should be sent for help to make sure that they have the correct information and location. If a decision is made to move the victim, rescuers should be notified as to what trail will be used.

Now it is a waiting game. The victim's spirits must be kept up. He/she should be kept calm. Watch for shock. The first signs of shock would be if his/her skin turns pale (or bluish) and is cold to the touch. The skin is clammy, and the victim

BACKGROUND INFORMATION (Cont'd.)

becomes weak. The pulse is rapid and too faint to be felt. The rate of breathing may increase.

Treatment for shock is to keep the body temperature normal. Assure adequate oxygen supply, and place the victim in a position to improve circulation. Fluids can also be administered if the victim is conscious. It should be noted that 90 percent of shock victims who die, do so directly from the shock symptoms. In all cases of shock, elevate the victims legs.

In most instances, you and the victim should remain where you are. It is generally better not to move the victim and aggravate the injury. Only in extreme emergencies, such as a flood, or earthquake, should the victim be moved.

Occasionally, when in deep wilderness (perhaps 100 miles from the nearest road), a decision will be made to move the victim. This decision will be influenced by how long it will take for rescue squads to arrive. If you know it may be days before help can reach the victim, it may be necessary to seek aid along the trail.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate correct procedures to determining extent of injuries.
2. Demonstrate the four basic methods used to stop severe bleeding.
3. Demonstrate how to immobilize all sprains and breaks.
4. Demonstrate how to treat a puncture wound.
5. Demonstrate the pupillary reaction test.

"DOING ACTIVITIES"

Students will be able to:

1. Observe paramedics teach CPR and mouth-to-mouth resucitation. (There is a legal requirement for CPR teaching that should be adhered to; check with the Red Cross or Heart Association.)
2. Immobilize limbs of other students, using readily available materials.
3. With a simulated bleeding victim, practice four techniques to stop bleeding.
4. Treat a fellow student who is supposed to be unconscious because of and accident. Take steps to stabilize the victim. Make him/her as comfortable as possible and determine what may have caused the condition.
5. Use a light source to observe pupillary reaction.

CONCEPTS

1. An adequate and well-stocked first aid kit is important to have with you in the mountains.
2. First aid kits should be stocked based upon the number of persons in the party.
3. In a small group, one person should be designated to carry the kit. If a large group (13-30) is involved, two persons should be designated.
4. Materials should be wrapped so that unused portions do not become dirty through handling.
5. The first aid kit may include camp equipment as well as specific items packed for first aid use.

BACKGROUND INFORMATION

First aid kits are an important part of a hiker's equipment. Emergencies can arise at anytime, and complications can be avoided if the injury is treated immediately. In stocking a first aid kit, consider the number in the party. Also, the items should be wrapped so that unused items remain sterile.

One person should carry the first aid kit if the group is small. If the hiking party is large, two persons should be designated to do so. The following items should be included in the first aid kit:

- Sun tan lotion and lip balm
- Insect repellent
- Water treatment tablets (if uncertain about purity of water supply)
- Mole foam
- Band aids (assorted sizes)
- Elastic bandages (one 3 inches and one 4 inches)
- Adhesive tape (one 3-inch roll)
- Rolled gauze bandages
- Aspirin
- Antacid tablets
- Salt tablets
- Tweezers
- Snakebite kit
- Calamine lotion
- Bandage
- Soap
- Scissors

Individuals with specific prescriptions should carry their own medications. Unusual medical histories should also be reported to teachers in case of emergencies.

Administering first aid in the mountains means using everything at your disposal. This includes making litters out of jackets or blankets, using shirts for binding broken limbs, and using tent poles as splints.

CURRICULUM OBJECTIVES

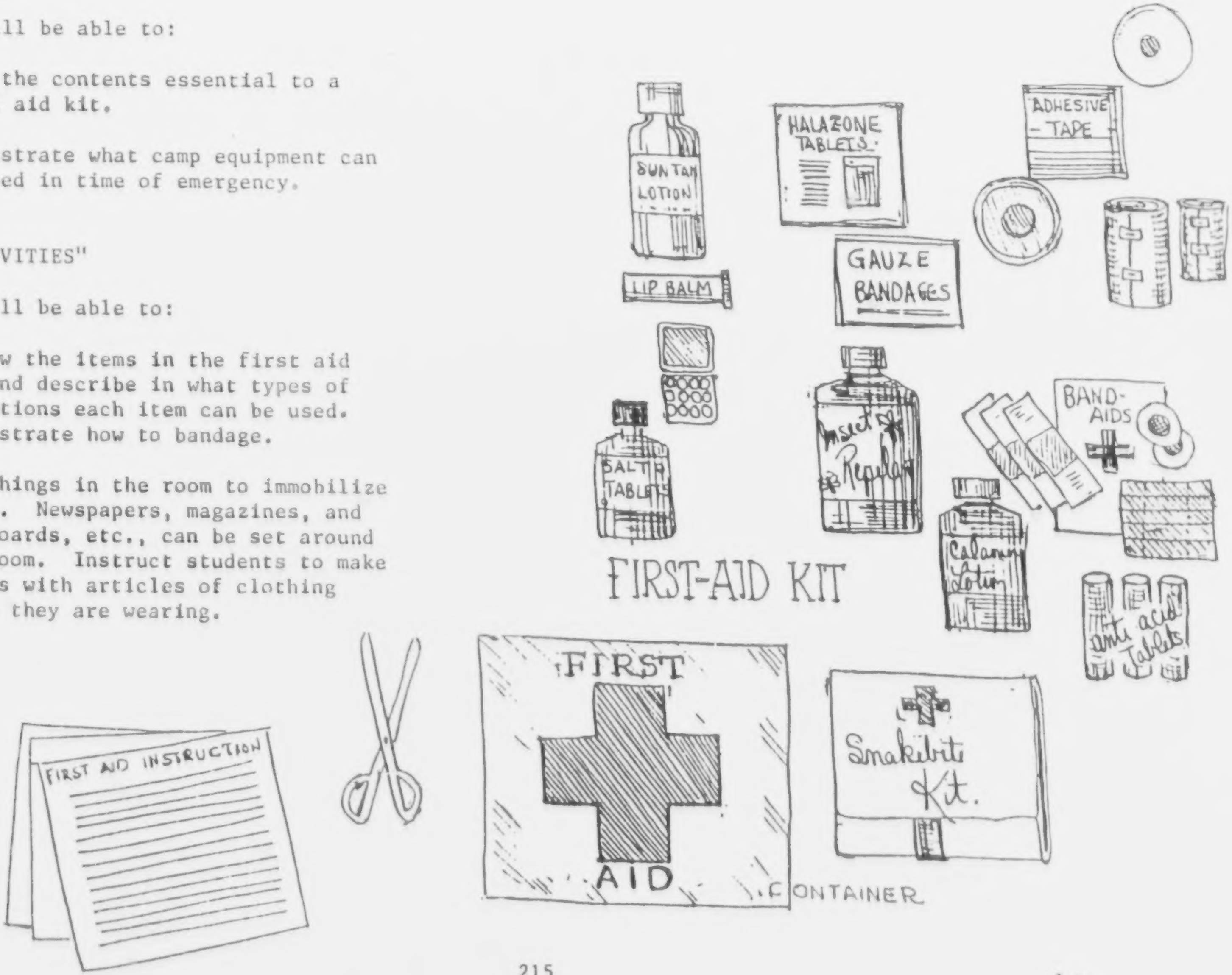
Students will be able to:

1. List the contents essential to a first aid kit.
2. Demonstrate what camp equipment can be used in time of emergency.

"DOING ACTIVITIES"

Students will be able to:

1. Review the items in the first aid kit and describe in what types of situations each item can be used. Demonstrate how to bandage.
2. Use things in the room to immobilize limbs. Newspapers, magazines, and cardboards, etc., can be set around the room. Instruct students to make slings with articles of clothing which they are wearing.


SUN TAN LOTION
HALAZONE TABLETS
ADHESIVE TAPE
LIP BALM
GAUZE BANDAGES
SALT TABLETS
Insect Repellent
BAND-AIDS
Calamine Lotion
anti acid Tablets
FIRST-AID KIT
FIRST AID INSTRUCTION
FIRST AID
CONTAINER
Snakebite Kit.

BEST COPY AVAILABL

CONCEPTS

1. Hypothermia is the loss of heat from the body with gradual stoppage of metabolism.
2. Hypothermia, if not treated, can be fatal.
3. Frostbite is the destruction of cells through crystallization of fluids in the tissues.
4. A person suffering from any cold injury should never be given alcohol as a stimulant.

BACKGROUND INFORMATION

Hypothermia claims more victims than most people realize. It occurs when the loss of body heat exceeds that of heat production. This heat loss does not require freezing temperatures but can occur when you inhale cold air and exhale warm air. Heat radiating from the body is another avenue of loss. Wet clothing or clothing that doesn't protect a person from the wind causes rapid heat loss. Exhaustion and not eating well can also add to heat loss from the body.

Symptoms of hypothermia include uncontolled shivering, which leads to deterioration of coordination. The pace slows, victim is unable to speak, shivering ceases, muscles stiffen, and the victim is unable to walk. Eventually, the muscles become rigid, pulse and respiration are slowed, there is loss of consciousness, and then death comes.

Treatment for hypothermia is as follows:

1. Prevent further heat loss. Move the victim into a shelter, massage his/her body, and keep him/her awake.
2. Warm the body, using some external heat source. If possible, build a fire. If necessary, use your own body heat by snuggling against the victim.
3. Administer hot foods to supply fuel for energy.

Recovery is generally rapid.

Preventing hypothermia is not difficult. Proper clothing for cool and/or wet weather is important. Select clothes that will insulate and ventilate. Wool and the polyester down substitutes are relatively effective materials to consider. Also wearing thinner layers of clothing helps to trap air and insulate while allowing ventilation. Cover the head in cold weather.

Keeping in good physical condition and having adequate food and water are also important in preventing hypothermia. In the evening, it is wise to set up camp while your energy level is still adequate to build a shelter to protect yourself from rain and wind.

BACKGROUND INFORMATION (Cont'd.)

There are two types of frostbites: superficial and deep. Superficial frostbite affects only the outer layers of skin. Deep frostbite affects deeper tissue, muscle, and bone.

The symptoms of frostbite are biting cold leading to numbness. Some redness and puffiness appear. More swelling occurs, and the skin turns violet. If the frostbite is unchecked, the skin becomes yellowish white and feels hard and woody. The skin becomes puffy and shiny; blisters appear, and coloration may be violet. Blisters break, and tissue peels away. If the victim is treated at this point, there is a possibility of healing. Next, the blisters dry, turn black, and slough off. Infection and gangrene may set in. Amputation is usually necessary if the frostbite advances to this level.

In the event of superficial frostbite, warm the affected area by sticking cold fingers under armpits and cold feet inside someone else's warm clothing. Cover nose and ears with hands. Build a fire if possible. Thawing may cause tingling and redness. If blisters appear, do not break them. Do not rub affected areas with snow.

Deep frostbite requires extensive treatment. Thawing should not be attempted in the field for it will leave the victim completely disabled. Prevent further damage by use of padding, and evacuate the victim quickly to the nearest medical facility.

The best treatment for frostbite is prevention. Keep extremities warm. Do not restrict circulation. When extremities become cold and numb, stop and rewarm at once. Wearing the proper protective clothing is most important. An extra pair of socks, warm boots, and wool-lined mittens and ear coverings are excellent protection. In cold weather, group members should check each other for signs of frostbite. Do not overtighten boots.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize and describe the symptoms of frostbite and hypothermia.
2. Demonstrate the ability to administer proper first aid for hypothermia and frostbite.
3. List ways to prevent injuries resulting from the cold.

"DOING ACTIVITIES"

Students will be able to:

1. Demonstrate the appropriate first aid treatments for hypothermia and frostbite. Conduct a mock session of treatment.
2. View films on how to avoid and treat cold-related injuries.

CONCEPTS

1. There are three major altitude-related human illnesses:

   - Hypoxia
   - Altitude sickness
   - Pulmonary edema

2. Hypoxia is a deficiency of oxygen in tissues to which the body can adjust by increasing the number of red blood cells.

3. Altitude sickness is probably a combination of a lack of oxygen and acidosis. (Acid-base balance of the blood seems to shift to the acid.)

4. Pulmonary edema occurs as the lungs suddenly and unexplainedly begin to fill with fluid. (Immediate treatment is necessary.)

BACKGROUND INFORMATION

The effects of altitude vary from person to person. Some people suffer greatly while others complain only of feeling tired.

Hypoxia

Hypoxia is a deficiency of oxygen in the tissues. The reduced amount of oxygen at high altitudes causes a drop of oxygen in the blood stream. The symptoms are reduced muscular performance, dulled mental faculties, and impaired judgment. Given a few days at the altitude, body adjusts by increasing the number of red blood cells. Meanwhile, the victim should avoid unnecessary activity.

Altitude Sickness

Altitude sickness displays a varied collection of symptoms. A mild stage may include a headache and trouble attempting to sleep. Other symptoms may be loss of appetite, drowsiness, mild nausea, and shortness of breath. The symptoms may increase to include vertigo, a splitting headache, vomiting, and unconsciousness.

Lack of oxygen is thought to be the basic cause of altitude sickness, but the use of alcohol and cigarette smoking seems to increase the symptoms.

Pulmonary Edema

Pulmonary edema may occur above 8,000 feet. Its symptoms are: a tightness of chest, bubbling breath sounds, and a white, frothy sputum. It may be fatal if not reversed. The subject should be moved to a lower elevation. A decrease of 1,000 feet will normally cure the illness.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize the symptoms of hypoxia, altitude sickness, and pulmonary edema.
2. Demonstrate the proper treatment of hypoxia, altitude sickness, and pulmonary edema.
3. List ways in which altitude sickness might be avoided.

"DOING ACTIVITIES"

Students will be able to:

1. Participate in a mock exercise in which they act out symptoms of some altitude illness. The other students are then asked to diagnose the illness and prescribe the proper treatment.
2. View films relating to altitude illness that show symptoms and facilitate diagnosis and proper treatment.

CONCEPTS

1. Heat exhaustion can result from prolonged physical activity in a hot environment and evaporation from the lungs.
2. The body is cooled chiefly by the action of the skin in the evaporation of perspiration.
3. Heatstroke (sunstroke) is caused by the breakdown of the body's cooling mechanism.
4. Heatstroke is a medical emergency.
5. Heat cramps occur during heavy exercise in hot environments.

BACKGROUND INFORMATION

The body maintains an almost constant temperature of 98.6 degrees Fahrenheit. It produces heat by muscular activity and by the burning of food.

The body is cooled mainly by evaporation of perspiration through the skin. A hot environment can interfere with the body's elimination of heat. This is the main cause of heat illnesses.

Heatstroke (sunstroke) is a medical emergency. If left untreated, it can be fatal. Sunstroke victims have hot dry skin, do not perspire, and have a body temperature higher than 105. The victim becomes confused, loses coordination, and collapses into unconsciousness.

Treatment begins by cooling the victim. This can be done by immersion in cold water, packing snow and ice around the body, and fanning the victim. Be careful not to cause frostbite. Administer cool water and salt if the victim is conscious. Massaging of the limbs will prevent cooling of blood and improve circulation so that the cool blood will flow inward to reach internal organs.

Heat exhaustion occurs rapidly. The symptoms are a headache, nausea, vomiting, rapid heart rate, and restlessness. The skin is cool, clammy, and pale. Let the victim rest in a cool place and administer salty fluids. Heat exhaustion is not life threatening.

Stretching the affected muscle and applying constant pressure is the best way to break a heat cramp spasm. Once the muscle relaxes, massage it gently. Never beat on the muscle. Administer salt and water. Lack of salt is one of the principal causes of muscle cramps.

Heat illnesses can be avoided by using common sense. In extremely hot environments, do not overdo. Do not push the body to its limits. Take rest breaks (in shaded areas,

BACKGROUND INFORMATION (Cont'd.)

if possible). During these breaks, sip on water and nibble on salty food. This procedure replaces lost fluids and salt. Do not take in great quantities of cold water at one sitting. This can cause a heavy feeling because cold water cuts down circulation in skeletal muscles.

A minor annoyance is heat rash. This is caused by an obstruction of sweat glands. Although bothersome, it is not serious. Cooling of the body and the adjustment of clothing are about all that one can do. To apply creams and ointments will only stop up the sweat glands, making the heat rash worse.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize the signs and symptoms of heat exhaustion, sunstroke, and heat cramps.
2. Demonstrate the ability to administer proper first aid for these three heat-related illnesses.
3. List ways to prevent heat-related illnesses.

"DOING ACTIVITIES"

Students will be able to:

1. Participate in a mock session involving the diagnosis and treatment of heat-related illnesses. An individual describes his/her symptoms, and the other students diagnose the illnesses and perform proper first aid treatment.
2. View films on dealing with heat emergencies.

CONCEPTS

1. A rattlesnake bite causes severe reactions and occasionally leads to death.
2. In the treatment, the constructing band should not be too tight but should allow oozing from the wound to continue.
3. The patient should be kept calm to slow the heart rate.
4. A slower heat rate reduces the spread of the venom.
5. Incisions and cuts should not be made if medical help is available.

BACKGROUND INFORMATION

A rattlesnake bite can cause an acute reaction and occasionally death. Proper and speedy treatment of snakebite is important. If medical help is near, an incision should not be made.

When the snake is no longer a threat, have the victim lie down. If possible, have the affected part of the body in a position lower than the heart.

Now put a constricting band on the patient two to three inches above the wound. One should be able to slide two fingers under the band. The wound should be allowed to ooze. Keeping the patient calm keeps the heart rate slow. A slower heart rate reduces the spread of the venom.

If medical help is not near, proceed by taking a knife (preferably sterile) and making two vertical cuts in the fang marks in line with the limb and one half inch long. This is to encourage bleeding. Make a second set of incisions below the first set. (Fangs point downward. Most venom is below the fang marks.)

Try to encourage bleeding. If a snakebite kit is available, use the suction cups. Sucking with the mouth is possible, but it is discouraged because of the possibility of sores or cavities in the mouth which could absorb the poison.

Try to keep the incisions bleeding for 20 to 30 minutes. Wash wound thoroughly with soap and water, and apply a clean dressing.

Expect swelling and nausea. If swelling reaches the constricting band, place a second band two to three inches above the first. Do not remove first band.

A cold compress can be applied to the wound. But, above all, the patient should be kept calm.

The best possible "treatment" for snake bite is prevention. This means learning the habitats of the snakes. Do not walk

BACKGROUND INFORMATION (Cont'd.)

or stick your hands in places where you cannot see; avoid placing your hands in holes; and stay on the trail.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate the proper treatment for a rattlesnake bite.
2. Identify rattlesnakes and their hiding areas by sight.

"DOING ACTIVITIES"

Students will be able to:

1. Stage a mock snakebite incident and treat the "victim."
2. Distinguish between a poisonous snake and a non-poisonous snake.
3. List safety precautions that should be taken to avoid snake bites.

HEY -- WHAT'S GOING ON - "MAN BITES SNAKE!" OUCH!

CONCEPTS

1. Every hiker should recognize and avoid Poison Oak at all times of the year.
2. Insect stings can produce allergic reactions that may lead to death.
3. Tarantula bites may cause infection.
4. Black widow spiders and scorpions can cause severe local reactions and, in rare instances, cause death.
5. Ticks can transmit germs of Rocky Mountain Spotted Fever.
6. Ticks can be removed by putting oil on the body.

BACKGROUND INFORMATION

Poison Oak can be identified by the three small leaves which make up the leaf. In the summer and fall, the leaves may appear to be reddish. In late fall and winter in Southern California, there may be only bare twigs on Poison Oak. The plant can still cause an allergeric rash at this stage. Its flowers are pale yellow, and the white fruit hangs in clusters.

A rash from Poison Oak usually takes 48 hours to develop. One good way to preventing this rash is to bathe immediately and wash all clothing which might have come in contact with the plant.

If a rash appears, use calamine lotion on the affected area. If the rash persists, medical treatment is advised.

For most individuals, stings from insects may cause a mild inflammation and some dis-discomfort. In the case of a sting, remove the stinger, apply a cold application, and spread on a soothing lotion, such as calamine.

Tarantulas are large, fierce-looking arachnid, but they are harmless. The bite may cause inflammation and a little discomfort.

Ticks can transmit several diseases, including Rocky Mountain Spotted Fever. They are attracted to warm bodies and feed by adhering to the skin and the scalp. It is important to remove all parts of the tick. Otherwise the remaining parts can cause infection.

The most effective way to remove a tick is to apply a heavy oil (salad, machine, or mineral) to plug up the pores of the skin in the area where the tick is located. The tick should let go, and the area of the skin should be washed with soap and water.

If there is a severe allergic reaction to a black widow spider, scorpion, or insect

BACKGROUND INFORMATION (Cont'd.)

bite, a constricting band should be placed several inches above the place where the bite occurred. The band should be located between the heart and the location of the bite.

Keep the victim lying down and the affected portion of the body below the level of the heart.

For a highly sensitive person, medical help should be sought immediately. Delay can be fatal.

CURRICULUM OBJECTIVES

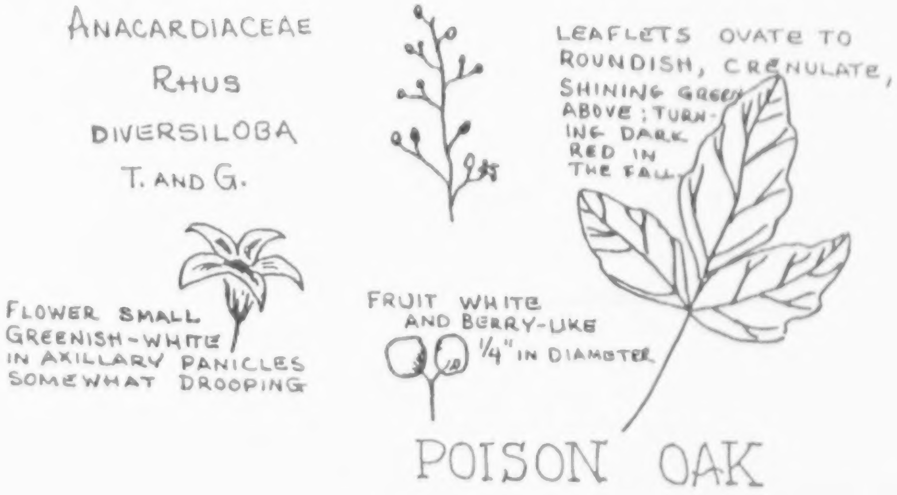
Students will be able to:

1. Recognize and avoid Poison Oak at all times of the year.
2. Discuss the proper treatment for Poison Oak and methods of prevention.
3. Demonstrate how to remove a tick.
4. Demonstrate how to administer proper treatment for allergic reactions to insect, black widow spider, and scorpion bites.

"DOING ACTIVITIES"

Students will be able to:

1. Remove the insects and arthropods common to the area of the hike which can cause harm to humans. Each student should know what the organisms look like and how to behave around them.
2. View pictures or prepared specimens of Poison Oak. Each stage in its life cycle should be described thoroughly to assist with quick identification.
3. Participate in a mock exercise in which allergic reactions, diagnosis, and treatment are simulated.


ANACARDIACEAE
RHUS
DIVERSILOBA
T. AND G.
LEAFLETS OVATE TO ROUNDISH, CRENULATE, SHINING GREEN ABOVE; TURNING DARK RED IN THE FALL
FLOWER SMALL GREENISH-WHITE IN AXILLARY PANICLES SOMEWHAT DROOPING
FRUIT WHITE AND BERRY-LIKE 1/4" IN DIAMETER
POISON OAK

CONCEPTS

1. Appropriate cooking methods are required in order to prepare foods properly.

2. Several different sources of heating food can be used in preparing a meal.

3. Before a wood fire is started, there are several factors to be considered.

4. Portable stoves are a convenience, but there are many things to consider before deciding to use them on a backpacking trip.

BACKGROUND INFORMATION

Camp cooking consists of three basic methods: boiling, frying, and broiling.

Boiling generally consists of cooking a one-pot meal over the flames. It is the simplest and most foolproof of the cooking methods. Food is brought to a boil and then cooked until done.

For boiling, the camper should have an aluminum pot of two-quart capacity and another smaller pot. Both pots should have lids. If the pots are of adequate size, they are less likely to boil over. Most dehydrated meals are prepared by this method. Meals that have been prepared in special plastic bags also can be heated, which streamlines the boiling method of cooking.

Frying is generally done in a light steel frying pan over coals. Some people prefer not to carry the extra weight of a frying pan. They have found that the bottom of an aluminum pot is adequate to fry bacon, scramble eggs, and even pan bread. A small piece of aluminum foil placed over a grate can also serve as a skillet for frying.

Broiling is done on a grate or on a stick held over the coals. The grate can be laid over the cooking fire and supported by two rocks.

In many places, frying and broiling are not practical because of the ever-increasing shortage of wood for cooking. In some national parks and forests, wood fires are prohibited. Some areas have seasons during which fires are prohibited because of the great risks involved.

Before you start a wood fire, consider the following:

1. Do you need a fire permit?

2. What directions and/or restrictions does your permit place on building fires?

3. Has an area of adequate size and depth been cleared around the proposed site of the fire?

BACKGROUND INFORMATION (Cont'd.)

4. Is water handy to control or extinguish the fire when necessary?

5. How large a fire must you have? "Think Small."

6. Are you prepared to extinguish your fire properly when it is no longer needed? Fires should only be left when dead out.

The success of a meal cooked over a fire is dependent upon several factors.

1. Boiling requires flames. Your fire must be constantly tended.

2. Frying and boiling should be done over coals, not leaping flames.

3. Hardwoods produce coals, but softwoods burn quickly and leave no coals.

Before starting a fire, it is important to have a good wood supply. Nothing is worse than having the fire burn down when the meal is half cooked. The wood used should consist of sticks that were lying on the ground. Limbs, dead or alive, should not be broken off trees. Tinder and kindling should be handy before attempting to start a fire.

When cooking and dishwashing are completed, the fire should be put out with dirt and water. Make sure it is completely out. It is a good practice to run your hands through the remains of the fire to verify that it is out.

More and more backpackers are relying on portable stoves for cooking. The stoves can be categorized by the type of fuel they use. There are gasoline, kerosene, alcohol, butane, and propane stoves.

Most of them are safe and reliable if care is exercised. As with other equipment, it is important to become thoroughly familiar with whatever type of stove that you use.

With dehydrated foods and portable stove, preparing dinner is simple. Most cooking becomes merely a matter of boiling water. It is even easy to heat a bowl of soup or a drink right on the trail.

The major drawback to using a stove is that only one food can be cooked at a time. Therefore, a small group should carry at least two stoves. Frying food on a stove is somewhat difficult since the heat is concentrated in a relatively small area.

Before taking a stove on the trail, make sure you have enough fuel to last for the entire trip. If using gas, use only white gas. If fuel is going to packed, it should be carried only in tightly closed metal

BACKGROUND INFORMATION (Cont'd.)

containers made specifically for that purpose.

The person designated to carry the stove and gas should not carry any food. Food is easily contaminated by volatile fumes.

Some precautions are important when using a stove. Never place a stove near an open fire. It may explode. Refill a stove only when it is cool. Watch for fuel leakage. When the light goes out on a gasoline stove, relight it at once.

CURRICULUM OBJECTIVES

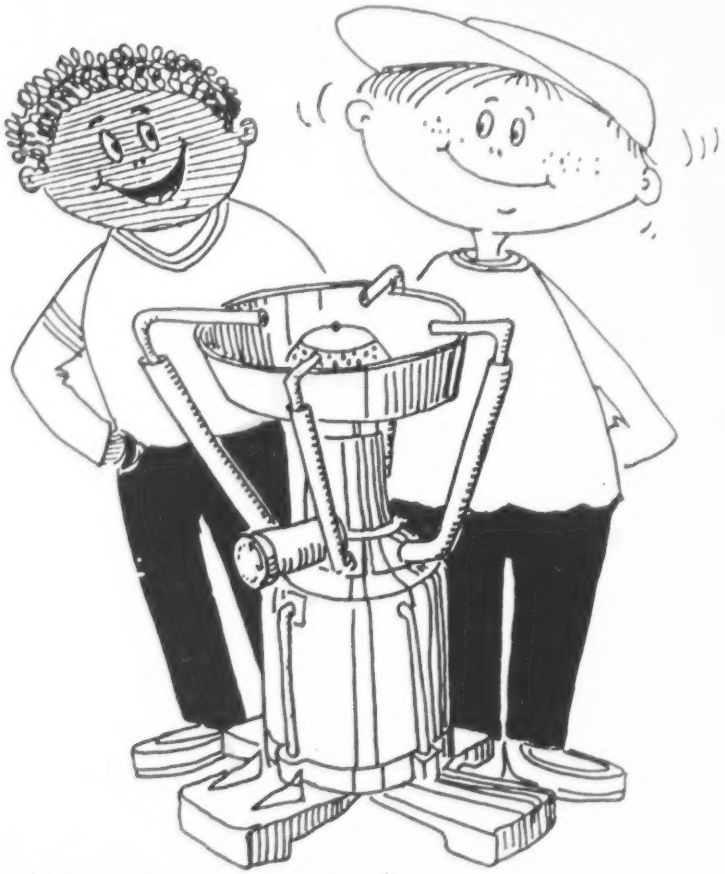
Students will be able to:

1. Demonstrate the three different methods of preparing a meal.
2. Domonstrate the correct way to use a backpack stove.
3. Demonstrate the proper way to start a fire, use it, and extinguish it.

"DOING ACTIVITIES"

Students will be able to:

1. Prepare at least one meal using the three methods of cooking: boil, fry, and broil.
2. Build a wood fire.
3. Cook on top of an individual camp stove.



"WHAT A BEAUTY", EVEN I COULD COOK A GREAT MEAL.

CONCEPTS

1. Many things can be done to enhance the flavor of camp food.
2. Camp cooking is somewhat different from that of the home; there are adjustments that have to be made.
3. The timing and planning of a meal must have some flexibility when camping.
4. Utensils can be adapted to the camper's personal needs to make them easier to use.

BACKGROUND INFORMATION

Camp cooking can be a challenging experience for the beginner. Helpful ideas on cooking, flavoring, and meal planning will be suggested in this section. There will also be some mention of how to customize cooking utensils to make cooking easier.

One of the things to remember is that water boils at a lower temperature as altitude increases. Therefore, more water will be needed and your meal will take longer to cook at higher elevations. Since cooking does not begin until the water boils, cover the pot to lessen the time needed.

Remember to stir the food as it cooks. Otherwise, main dishes have a tendency to stick. Many recipes call for margarine, which keep food from sticking to the pot. A teflon-coated pot or frying pan can be used to prevent sticking although it is heavier than a regular backpacking pot.

Some dehydrated foods seem to have an unfamiliar taste. One example is dehydrated eggs. Sometimes the powder may not dissolve immediately. If this happens, let it set for a while; then stir the egg mixture until it is smooth. Now you can add onion flakes, ham chips, bacon bits, small pieces of salami or even chipped beef to flavor the eggs. The secret to cooking eggs is not to overcook them. If they turn brown, they are overdone. Start again.

Dry milk is also not readily palatable. If the milk is allowed to stand for 30 minutes, the flavor improves. Some campers add a few drops of vanilla to it.

Because so much fluid is lost by the body while hiking, every meal should have several food items which replenish the body fluids. One interesting drink is hot jello. About 1 ounce of gelatin is used for one serving. This is very nutritious.

Snacks and "filler-up" foods are important, but they should only be served when the

BACKGROUND INFORMATION (Cont'd.)

main meal is well on the way to being finished. This eliminates the problem of leftovers. A favorite evening snack is popcorn. It can be popped in a camp pot.

In planning meals, a camper should always allow for changes in schedule. If heavy exertion is to follow a meal, keep the meal light. Sometimes a group needs to reach a certain destination at a specified hour. Breakfast on such days should be very simple to save time.

When planning a menu, you can repeat main dishes, especially if the group liked them. Sometimes new dishes are not received with enthusiasm.

A variety of textures and colors can make meals more appetizing. If one serves mushroom soup, macaroni and cheese and vanilla pudding at one meal, it may look to be monotonous. Why not serve vegetable soup and cookies instead? Different textures and colors make any meal more appealing.

Cooking utensils should be as streamlined and as utilitarian as possible. Aluminum pots are the best. They should be without handles. Most pots come with bails; but, if not, you can make your own. A three-wire bail with the three wires coming together at the top is the most satisfactory as it is more stable than the conventional one-wire bail. For gripping the pots, and old glove or neckerchief is handy.

Many backpackers find that the only silverware necessary is a large spoon. You can mix food with it and eat with it. The handle can be bent over so it won't slip into the pot you are stirring. Foods that require a knife can be cut with your pocket knife.

Often planning the next meal in advance will cut down on cooking time. Dehydrated foods can be carried in plastic soaking jars in the pack or tied to the back of the pack so they'll be ready for cooking at meal time.

Soaking jars can be plastic jars or bottles with screw-on lids. Some of the better containers are prescription jars from a pharmacy. They should hold at least one pint of fluid. Permanent marks can be made on the sides to indicate the number of ounces. In this way, guess work in mixing ingredients can be avoided.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate how to flavor and mix various foods to improve their taste.

CURRICULUM OBJECTIVES (Cont'd.)

2. Demonstrate the adjustments in technique that are necessary in cooking on the trail.

3. Describe some ways of making meals more appetizing when camping.

4. Discuss ways to adjust the meals with the schedule of the day.

5. Discuss the changes that can be made to cooking utensils that will make them easier to use.

"DOING ACTIVITIES"

Students will be able to:

1. Experiment with the preparation of dehydrated eggs to determine whether they can prepare a recipe tasty enough to please their friends.

2. Cook a meal in which all foods have the same texture and color and a second meal that is varied in its coloring. Ask class members to compare their reactions to the two meals.

3. Streamline cooking equipment, such as by removing handles and attaching bails and making plastic soaking jars as well as marking quantity levels in ounces on the jars with an indelible felt tip pen.

4. Read and follow recipe directions, using variations where needed. Add spices at the end to enhance flavor.

Al's outdoor Gourmet Cooking
DILL
DRIED CHIVES
FRESH HERBS
GRAND MARNIER

"GRATIN AUX FRUITS DE MER, IS ALMOST READY!"

CONCEPTS

1. Backpacking meals should be appetizing yet nutritious.
2. Menus should provide a proper balance of protein, carbohydrates, and fats for hiking purposes.
3. It is important to calculate accurately the amount of food needed by a party of hikers.

BACKGROUND INFORMATION

As in the home, it is important to plan a menu when backpacking. In planning, one must consider the number of persons in the party, the length of time to be spent on the trail, and the possibilities of substitutions.

The tendency for most hikers is to throw a few items together and to begin their excursion hastily; but, to have a successful time camping, they need good food. A camp menu need not be fancy, but it should be wholesome and substantial.

In menu planning, costs should also be considered. Often it is cheaper to buy an item at the supermarket than at a backpacking store. It is also a good idea to collect the money necessary from group members before purchasing food.

It will take imagination to determine necessary protein, carbohydrates, fats, vitamins, and minerals. The diet should contain 12 percent protein, 53 percent carbohydrates, and 35 percent fat (not as necessary for a short trip). The carbohydrate requirements can be satisfied by starches and sugar. Fat can be derived from butter, margarine, bacon, and bacon drippings. Protein can be obtained from powdered milk, eggs, chipped beef, and cheese. Whole wheat cereals, potatoes, beans, and vegetables furnish proteins and other needed minerals. In a menu, providing adequate carbohydrates is not a problem, but care is needed to include sufficient protein and fat. If meals are planned properly, there should be little need for candy.

Accessories, such as salt, sugar, syrup, jam, and jellies, should be provided as needed. Salt is important. It should be replenished because much is lost by the body in perspiration. Spices and other condiments can be used to add flavor. Cocoa is useful as a drink as well as a dessert.

After the menus have been planned, list all the ingredients and how many times each is used. Then multiply that number by the required amount (ounces needed per serving). This figure can be obtained by consulting a buck purchaser's handbook. Most of them have a master food list which specifies the number of ounces needed by a person at one serving. Now multiply the total number of ounces times the number of persons in the group. You now have the

BACKGROUND INFORMATION (Cont'd.)

amount you should purchase. Generally, 1½ to 2 pounds of food is allowed per person. Altitude will reduce appetites, however, and 1½ pounds per day is a better average for at least the first three days. Shopping lists can be made and the quantities needed can be purchased. Consider the following:

1. When preparing meals for adolescents, add 25 percent more food. This added intake can be easily accommodated by looking over the intended menu and expanding quantities of selected items, keeping in mind weight and food values.

2. It would be impossible to list all the recipes that are practical and that have been enjoyed by backpackers. Instead, each meal is described, ideas have been listed. One general caution is to keep recipes simple. Life on the trail will be more enjoyable if it is not complicated by unnecessary time spent in meal preparation. For novices, it is sometimes easier to start with freeze-dried food. The difference in price is worth the pleasurable experience derived from the time saved.

Breakfast can consist of (1) stewed fruit or citrus juice; (2) cooked cereal with margarine and milk; and (3) ham, bacon, or scrambled eggs. Milk is prepared to be used in the cereal as well as a beverage.

Lunches and snacks may consist of crackers, dry sausage, varieties of dry cheese, hard candies, dried fruits, hard cookies, and a pack of instant fruit drink that can be reconstituted with water.

1. Dinner can begin with soup and be followed by a main dish containing a starchy ingredient and meat or a meat substitute. A vegetable should be included, either as an ingredient in the soup, the main dish, or as a separate dish. A dessert and a beverage of choice can be added to complete the menu.

2. There are samples of recipe ideas for five persons:

    Breakfast

    a. Stewed fruit
        water 5 oz. = 50 ml.
        vacuum dried or regular dried fruit 7 oz. = 200 gm.
        sugar (optional) ¼ c. = 50 gm.

        Add fruit to cold water, and simmer 10 minutes irregular dried fruit. Add sugar and more water if needed. Double sugar for apricots. Nutmeg and brown sugar improve any stewed fruit mix.

BACKGROUND INFORMATION (Cont'd.)

b. Fine ground quick-cooking cereal (wheat hearts or Wheatena)

water	6 cup = 750 ml.
cereal	8 oz. (1⅓ cup) = 225 gm.
milk powder	4½ oz. (1½ cup) = 120 gm.
salt to taste	
seedless raisins or chopped dates (optional)	2 oz. = 60 gm.

Add margarine to water. When boiling, add the mixed cereal and milk powder. Stir vigorously. Salt to taste. Cook 5 to 10 minutes, adding more water if necessary and fruit if desired.

c. Bacon

bacon	8 oz. = 225 gm.

Use unsliced slab for it keeps the best. Use fat if possible in other cooking. Canned bacon is also available.

d. Milk

Use powdered milk package premeasured for use at meal. A few drops of vanilla helps the flavor.

Lunches and snacks

a.	Crackers	8 oz. = 225 gm.
b.	Dry sausage	6 oz. = 170 gm.
c.	Dry cheese	8 oz. = 225 gm.
d.	Nuts	5 oz. = 140 gm.
e.	Hard candy	4 oz. = 110 gm.
f.	Hard cookies	3 oz. = 85 gm.
g.	Fruit	
	Reg. dried	7 oz. = 200 gm.
	Vac. dried	5 oz. = 140 gm.

Dinner

a. Soup (vegetable)

water	2 qt. = 2.12 liters
mixed vegetable flakes	2 oz. = 55 gm.
onion flakes	½ oz. = 15 gm.
margarine	2 oz. = 50 gm. (½ cube)
bouillon cubes	5 = 55 gm.
salt and pepper to taste	

b. Macaroni and cheese

elbow macaroni	11 oz. = 300 gm.
cheese (mild or sharp)	6 oz. = 170 gm.
dehydrated bell peppers	3½ tsp. = 200 gm.
dehydrated milk	5 tsp. = 25 gm.

BACKGROUND INFORMATION (Cont'd.)

Cover the macaroni and bell peppers with water and soak them for 1 hour (can be soaking while hiking). Cut cheese into small thin slices.

Place macaroni and bell peppers in a pan, and cover with water and about ½ teaspoon salt. Bring to boil, and simmer it for 5 minutes. Add dehydrated milk and cheese during the last few minutes. Stir frequently, and add more water as needed. Add 2 teaspoons of margarine just before the cooking is finished.

c. Dessert - Instant pudding

instant pudding	8 oz. = 225 gm.
milk, powdered (1¼ cup)	4 oz. = 120 gm.
cold water	3½ cup = 438 ml.
peppermit candy (optional)	2 oz. = 55 gm.

Mix the pudding and the powdered milk. Gradually add the cold water, stirring until smooth. Vanilla pudding is good with the addition of crushed peppermint candy.

CURRICULUM OBJECTIVES

Students will be able to:

1. Plan meals for 3 days on the trail.
2. Plan meals which satisfy personal and group needs.
3. Plan meals which will supply the dietary needs of hikers.
4. Adjust menus and recipes to group size.

"DOING ACTIVITIES"

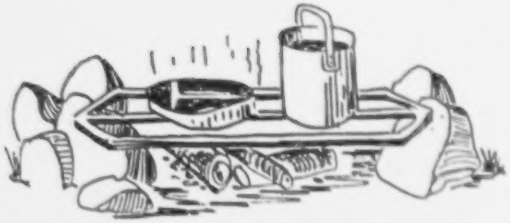
Students will be able to:

1. Discuss nutrition and the importance of the food groups to the body. The disadvantages of "junk food" should also be mentioned in the discussion.
2. Prepare 3 different menus for 3 days. They should include breakfast, lunch, and dinner and meet nutritional requirements.
3. Adjust their recipes to meet group needs. They will list meal ingredients and find out how much they need to buy.

"DOING ACTIVITIES" (Cont'd.)

4. Prepare sample recipes to determine which foods are palatable and also to verify the size of serving portions. This can be done as a classroom demonstration.

5. Sample some freeze-dried dinners which might be considered for use as extra food. These are welcomed when time is short for preparation of dinner and hikers are exhausted.



"I DON'T UNDERSTAND WHERE THAT "T-BONE" STEAK CAME FROM !!"
"WHY, THAT'S MY DEHYDRATED FOODS, MAKES DINNER A BREEZE."

CONCEPTS

1. Proper packing can reduce bulk and save weight.
2. Proper packing and labeling will alleviate confusion.
3. Proper packing will avoid unnecessary waste of food and protect it from unsanitary conditions.
4. Using the proper materials will prevent accidents.

BACKGROUND INFORMATION

After the menus have been planned and tested and the ingredients have been purchased, the next step is packaging the food in the most convenient and space-saving way.

Most foods carried on pack trips can be packaged in plastic bags sold by markets. or a bag of 2 ml. thickness is preferable. When the food is consumed, dispose of the bags in a litter can or pack them out at the end of the trip.

All dry food can be repackaged. Foods such as flour and sugar should be double bagged. When packaging food that comes from boxes, cut the recipe from the box and place it on the bag; or copy the recipe on a sheet of paper.

Small rubber bands can be used for closing the plastic bags. They are more effective than the wire, which can cut through the bags. Plastic ziplock bags can also be used.

When filling the bags with food, leave a small space at the top. Before closing the bag, squeeze all air from this space to prolong the freshness of the contents.

For packaging certain foods, such as margarine or butter, consider using plastic containers. Glass should be avoided at all times. Used containers can still be serviceable. Baking powder cans may be used for margarine and then packed out. They can also be used for storing powders.

Wrap shortening, bacon, and sausage sticks in heavy duty plastic bags and seal them tightly. Some people even like to pack bacon in sealed containers.

Poly squeeze tubes may be purchased and used for jam, jellies, and peanut butter. They work just like toothpaste tubes.

As the plastic bags are filled, label them with a felt tip pen. Bags that are repeatedly used may be labelled with a piece of tape so the writing will not fade.

For the final packing, a larger, thicker plastic bag is recommended. Bags in which ice cream is sold may be saved and used for this outer packaging.

BACKGROUND INFORMATION (Cont'd.)

For convenience, foods like cocoa, tea, milk, and fruit drinks can be placed in one bag. Condiments and vegetable flakes can be transported in another. Two approaches may be used in packaging food for meals. Some people like to put all the starchy food together and all the meat and meat substitutes in another bag, and so on. Others prefer to pack the large plastic bag according to the day. If the day is Monday, all of Monday's meal will be placed in the same bag.

If the party is large, it might be easier to work in groups of four. Then each person could carry a day's meal, and the weight can be distributed relatively evenly. Smaller students can carry food to be consumed early during the trip.

CURRICULUM OBJECTIVES

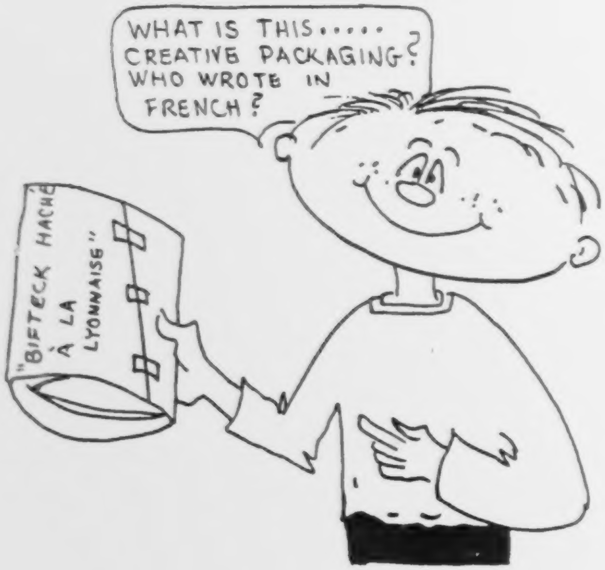
Students will be able to:

1. Measure, wrap, label foods and place them in their proper containers.
2. Observe how repackaged items take up less space and fit into their packs.
3. Demonstrate how quickly an item or meal can be located if proper packaging and labeling techniques are practiced.

"DOING ACTIVITIES"

Students will be able to:

1. Work in groups of five, packaging and labeling the prescribed amounts of food needed for their group's meals.
2. Demonstrate how proper packaging and labeling can avoid confusion. Pack a backpack, first using improper methods and then using the proper methods. Then call off different items and see who finds them first. This activity might be more interesting if some of the items looked similar or were packaged in a similar fashion.


WHAT IS THIS..... CREATIVE PACKAGING? WHO WROTE IN FRENCH?
"BIFTECK HACHE À LA LYONNAISE"

CONCEPTS

1. The first requirement in setting up a camp kitchen is fire safety.
2. The second requirement of setting up a camp kitchen is preservation of the wilderness from signs of humans.
3. The food supply must be protected from spoilage and animal scavengers.
4. Camp kitchen sanitation is very important if the camp is to function successfully.

BACKGROUND INFORMATION

The camp kitchen is of primary importance. The success of a kitchen site often is evident from the extent of satisfaction of the campers with the final product--meals.

The first requirement of a camp kitchen is to assure its safety from fire hazards. It should be set up away from brush, dead grass, and overhanging tree limbs.

If a wood fire is going to be used, an area with mineral soil, sand, or rock should be chosen for the fireplace. An area with much organic debris in the soil can cause problems. A fire which appears to be extinguished can smolder for days and spring into flames when on one is available to prevent a disaster.

The second most important requirement in locating a kitchen site is preservation of the wilderness. If it is evident that others have used a certain area for a fire, use the existing fire ring. Each new ring mars the ground surface. Also, do not set up a fire on a bare expanse of rock that can remain blackened for years or in a meadow which will remain scarred.

The ideal place to set up camp is a moderately open, flat area with dirt, sand, or rock. Water for cooking and drowning fires should be accessible. An area shaded from the hot afternoon sun is also desirable, but the morning sun is nearly always welcome.

Once the site has been selected, regular kitchen operations can begin. Campers need to protect the food supply against weather conditions. A simple polyethylene tarp or any other waterproof material can be used for this purpose.

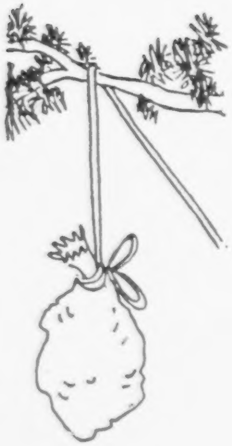
Protecting food from animals is another consideration. If trees are available, tie a line taut between two trees and suspend the food storage bag from a second line tossed over the first. The bag should be suspended 15 feet in the air. In bear country, it is not wise to hang a bag containing food above your camp. You may wake up with a bear in your lap.

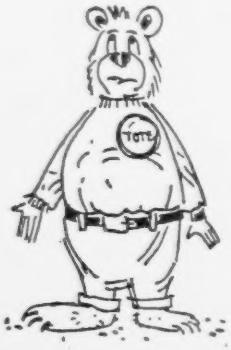
BACKGROUND INFORMATION (Cont'd.)

It is important to choose foods that keep well under trip conditions. To help keep the foods fresh, place them in the shade where it is dry and cool. If convenient, foods may be kept in underground areas, in or near streams in moisture proof containers, or in evaporation type coolers.

As cooking commences, so does the trash problem. Containers and non-combustible materials are to be packed out. When a fire is permitted, paper and leftover food may be burned if fed to the fire in small amounts. Aluminum foil should be packed directly into the litter bag. Foil is not consumed by fire but breaks into small pieces which are nearly impossible to separate from the ashes. These pieces do not wither away and remain for years in the environment.

The end of a meal brings another camp chore, dishwashing. Individual eating utensils can be washed by their owners. If the group is large, a pot of soap water and a pot of hot water for rinsing should be provided. This procedure affords protection against one of the main ways in which infections can spread through camp. Pots can be easy to clean if liquid detergent is applied to the outside, bottom, and sides before use. If there are some stubborn areas, wood ashes or sand can be used to scrub them. When diswashing is finished, dishwater and rinse water should be dumped well away from streams and lakes.





When the camp kitchen is dismantled, effort should be made to leave the camp site clean and natural. An unspoiled area should be returned as near as possible to its original condition.

CURRICULUM OBJECTIVES

Students will be able to:

1. List two major requirements of a camp kitchen site.
2. Describe how to protect food from animals and spoilage.
3. Describe how the kitchen should be maintained to assure proper sanitation.

"DOING ACTIVITIES"

Students will be able to:

1. Set up an "animal-safe" food storage site by typing a rope between two trees and suspending a "food bag" over it with a second rope.
2. Separate trash into combustible and non-combustible categories.
3. Burn various combustible items as instructed.

CONCEPTS

1. Mental attitude is a major key to enjoyable hiking experience.
2. Mental and physical factors involved in any activity are interrelated and inseparable.
3. Knowledge of what one might expect in a new experience can dispell apprehension and contribute toward forming a positive mental attitude.
4. Shared physical activities can lead to increased understanding and improved interpersonal relationships.

BACKGROUND INFORMATION

A hiking or backpacking experience should be enjoyed rather than considered merely a painful ordeal. Beyond a person's physical ability to cope with the considerable stress of hiking, mental attitude is a key to enjoying the experience. It is impossible to separate the physical and mental factors involved in any such activity. Mental attitude can either enhance or reduce a person's physical performance. It is also true that a person's physical condition will be directly reflected in his/her capacity to enjoy any physical activity.

The teacher should always prepare students for a hiking or backpacking experience well in advance. The demands to be placed on the group and on each individual should be described realistically as well as the location, elevation, and actual duration of the hike. Questions normally express concerns, and truthful, matter-of-fact explanations will usually relieve these concerns. If the teacher cannot satisfy them, selected students should assist in finding the answer. This lends credibility to the new information.

The teacher's enthusiasm is invaluable in building a proper class attitude and in deriving maximum value from the experience. Students should become excited thinking about the vistas to be seen, information to be learned, and experiences to be shared. There are two benefits of any hiking or backpacking experience that relate to attitudes. First, there is mental revitalization. The demands and rewards of such a trip can reaffirm for an individual his/her attitudes of self-confidence and self-reliance. Second, hiking or backpacking increases understanding among classmates and improves personal relationships. Again, it takes planning by the teacher to assure that desirable results occur.

Good equipment, proper clothing, and tasty food also contribute to improving the attitudes of everyone participating in a hiking or backpacking trip. Students should understand how fatigue, hunger, and improper clothing and equipment can have a

BACKGROUND INFORMATION (Cont'd.)

demoralizing effect. Every trip should be planned to avoid situations that detract from individual and group success. It is critical that students have desirable standards of conduct explained before the trip.

CURRICULUM OBJECTIVES

Students will be able to:

1. Explain why physical and mental aspects of an activity are interrelated and inseparable.
2. Describe the effect of poor equipment or food on attitudes.
3. List the standards of conduct expected by the supervising teacher.
4. Describe the effects of fatigue on attitudes.
5. Work within their group in a productive and cooperative way.

"DOING ACTIVITIES"

Students will be able to:

1. Evaluate equipment for the trip based on its ability to contribute positively to the attitude of its users (e.g., Which is the least desirable backpack? Why?).
2. Evaluate, before the trip, possible food selections and their effect on attitudes. Type, variety, and method of preparation of food all have a vital impact on mental attitude.
3. Before the trip, describe orally what they believe will be the most enjoyable and the least enjoyable aspects.
4. Mentally, rehearse the hike in advance of the actual trip.

The teacher will need to prepare well if this experience is to be effective. He/she should be ready to describe the main features of the terrain and be prepared to cope with the challenges that will be encountered .

CONCEPTS

1. Physical fitness is the ability of the body to respond to work and stress.
2. Pulse rate is the most convenient measure of the efficiency of body function.
3. A person's endurance and stamina are directly related to the oxygen consumption by body cells and the efficiency of blood circulation.
4. Physical conditioning includes diet and daily habits as well as physical activity.

BACKGROUND INFORMATION

When hiking/backpacking, the body is under considerable stress. Its ability to respond to conditions of work or stress is called physical fitness. It is very important to evaluate the prospective hikers in the group. The success of hiking or backpacking experience is to a great extent dependent on the fitness of the participants. Fitness depends on the development of four components:

1. Muscular strength.
2. Muscular endurance.
3. Cardiovascular endurance.
4. Flexibility

In preparation, it is important to recognize that any healthy body can hike. The mental demands are greater than the physical demands in most cases. Almost all teens are in sufficiently good physical condition to withstand a reasonable hike. The teacher should identify those students who are obviously unfit because of great obesity, very poor physical condition, or a specific physical disability. It is the teacher's responsibility to counsel such students concerning their need to achieve an acceptable fitness level before the trip. Any student not meeting reasonable fitness standards should not be included. Every student should be able to complete the trip without endangering his/her own health and safety or detracting from the enjoyment of the group.

Pulse rate is the most convenient means of measuring the efficiency of body function. A low pulse rate is generally indicative of efficiency because the heart is taking a longer rest between beats. Therefore, the heart fills up more slowly and more completely. A physiological definition of efficiency is "The amount of external work done at a moderate heart rate of 120 beats per minute." The "normal" resting rates are as follows:

Men	72-76
Women	75-80
Boys	80-84
Girls	82-89

BACKGROUND INFORMATION (Cont'd.)

These averages are not absolute, however, and rates from 50 to 100 are considered reasonable for some persons. Pulse rate tells most about the individual as it changes in response to stress. To increase fitness, a person should attempt to reduce his/her pulse rate. Whatever the type of exercise, these are guidelines:

1. Remember there is no defeat in a reasonable fitness program. All results are positive to a healthy body.

2. Beware of crash programs. It is best to work into fitness. The body adjusts to the demands that are placed on it. What people have done or not done over the past four weeks is more important than their genetics, past history, or medical profile.

3. Seek an exercise pulse rate (EPR) of 75 percent of 220, minus your age. For a 16-year-old, this would be:

$$\begin{array}{r} 220 \\ \underline{-\ 16} \\ 204 \end{array} \qquad \begin{array}{r} 204 \\ \underline{.75} \\ 153 \end{array}$$

   If an exercise does not increase the pulse rate sufficiently after 5 minutes, perform the exercise more rapidly.

The second determinant, body composition, is primarily measured in terms of one's percentage of fat. The reasonably fit body of a male is composed of from 15 percent to 20 percent fat. In females, "fitness fat" is 20 percent to 25 percent. Athletes and others in excellent shape have been able to reduce body fat to 10 percent or less. Too much accumulation of fat on the body indicates poor fitness and undesirable body composition.

Every student needs to be made aware of the demands of the proposed trip. Each should also be encouraged to evaluate his/her physical condition before hand and to fulfill any needs that become apparent. According to the American College of Sports Medicine, fitness is best measured and achieved by working on two specific exercise-dependent determinants:

1. Aerobic capacity.
2. Body composition.

Both of these determinants reach their optimum through endurance-type exercises that:

1. Use large muscle groups.
2. Can be maintained continually.
3. Are rhythmic and aerobic in nature.

BACKGROUND INFORMATION (Cont'd.)

Aerobic capacity is the maximum amount of oxygen a body can use when involved in strenuous exertion. The key is how much oxygen is transported to working cells to burn food and release energy. Another way of expressing aerobic capacity is to consider it a measure of one's heart. As a person increases aerobic capacity, he/she will note:

1. A lower heart rate (pulse).
2. An increase in stroke volume,
3. A strengthening of heart muscle.
4. An increase in artery elasticity.
5. The use of all strengthened muscles as auxiliary hearts.
6. An increase in capillaries to be utilized in stress situations.

Many exercises and regimes are proposed today to increase "aerobic" fitness. The American Council on Sports Medicine has listed the following requirements for any fitness training designed to improve aerobic capacity:

1. Frequency of 3 to 5 times per week.
2. Duration of from 15 to 60 minutes of continuous heart rate activity (dependent on beginning condition).
3. Intensity of 60 percent maximum heart rate reserve (HRR).

In simple terms, teenagers usually achieve 60 percent HRR at 130 to 135 beats per minute while adults achieve 60 percent at 110 to 120 beats per minute.

Physiologists can conduct tests to determine accurately a person's body composition, but for the purposes here simply recognize that inactivity and overeating can increase fat storage and make a body less fit for hiking. If a person can meet the pulse rate tests and is flexible and strong enough to hike, overweight is not a concern.

During the conditioning process, the student should keep the specific requirements of hiking in mind. Conditioning should strengthen legs and toughen feet. These tools of the hiker will be the first to hurt if not properly conditioned. Running is an excellent complete exercise, well suited to preparation for hiking. Jumping rope is also excellent when space or time is limited. It is also vital for students to consider diet and daily habits (e.g., sleep, tobacco use, coffee comsumption, etc.) in any conditioning program.

CURRICULUM OBJECTIVES

Students will be able to:

CURRICULUM OBJECTIVES (Cont'd.)

1. Define accurately the term physical fitness.
2. Recognize that a conditioning program should involve diet and daily habits as well as physical activity.
3. Define aerobic capacity and body composition and relate these to personal fitness.
4. Explain why endurance-type exercises are used to the optimum in fitness conditioning.
5. List the basic requirements for any fitness training designed to improve aerobic capacity.
6. Describe how to arrive at one's exercise pulse rate (EPR).
7. Demonstrate how to take accurately their own pulse rates.

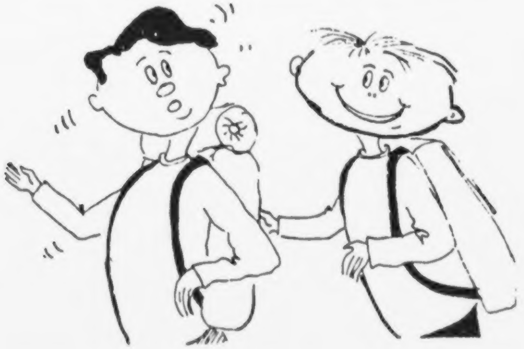
"DOING ACTIVITIES"

Students will be able to:

1. Work in groups of four to determine each student's exercise pulse rate.
2. Prepare a personal evaluation of fitness on the basis of aerobic capacity and body composition.
3. Prepare a personal running regime if their fitness evaluation indicates a need to improve.

   See Background Information for guidelines. Physical Education Department tests can be used to evaluate fitness. Also, the department can assist in planning fitness exercises.
4. Take their own pulse rates at rest, after 10 minutes of exercise, and five minutes after exercise to determine recovery rates.
5. Evaluate their normal diet and daily habits for items that might adversely affect fitness.

   For the "fit individual," the five-minute rest after exercise should lower the pulse rate to less then 120. After 10 minutes, the pulse rate should be below 100.



"MY EPR IS 145, HRR IS 130 AND MY PS IS 82. AT TIMES I FEEL LIKE A ROBOT."

CONCEPTS

1. Health is the freedom of a body from disease.
2. Personal health and fitness do not always correlate.
3. Most trail sickness is caused by or made more serious by poor sanitary conditions and unsanitary practices.
4. Good health habits are a personal and a group responsibility.

BACKGROUND INFORMATION

The term health refers to the absence of disease from the body. It is best achieved by the practice of habits of living that cause minimum exposure to disease and provide maximum capacity to resist disease. These habits are referred to as hygiene and include personal cleanliness, adequate rest and sensible diet.

Although a student may not be seriously ill, his/her hygienic problems can make the trip definitely uncomfortable for him/her and cause it to be unpleasant for the group.

Everything possible should be done in advance to motivate trip participants to achieve a maximum level of health. Some hikers begin a trip already ill but without experiencing symptoms.

The practice of good hygiene on the trail will enable the group to be more alert, more energetic, more open to learning, less prone to argumentation, and less prone to accident.

It is important that the group's state of health and hygiene practices be considered by all participants as an individual responsibility. Every hiker should protect and care for his/her own health and for the health of other campers. The following specific health practices should be taught:

1. Cleanliness during food preparation and serving.
2. Proper disposal of human waste and garbage.
3. Prompt first aid for all scratches, cuts, and abrasions.
4. Care of hair, skin, and nails.
5. Oral and dental care.
6. Adequate sleep.
7. Abstinence from use of alcohol, tobacco, and drugs.

BACKGROUND INFORMATION (Cont'd.)

It is important for all students to recognize that, no matter how physically fit they are, they can become sick and perhaps pass their illness to other members of the group.

A student's foolish disregard of illness should not be allowed to jeopardize the "group health."

CURRICULUM OBJECTIVES

Students will be able to:

1. Define health and hygiene.
2. Explain why a person's state of health and physical fitness do not always correlate.
3. List basic hygiene practices to be followed in preparation for the hike.
4. List basic hygiene practices to be observed during the time on the trail.
5. Explain the germ theory of disease and ways of spreading and controlling communicable disease.
6. Illustrate good hygiene on the trail.

"DOING ACTIVITIES"

Students will be able to:

1. Report a common disease, describing its cause, spread, and control.
2. Do research and report to the group on alternative ways to perform the following while in the mountains without normal equipment and supplies:
    - Clean teeth
    - Wash skin
    - Wash hair
    - Treat scratches
3. Present an imaginary situation in which a meal is prepared and served in such a way as to cause everyone in the group to become sick.

"THIS IS A FUN WAY TO BRUSH MY TEETH"

CONCEPTS

1. The most important aspect of personal conditioning is actual performance.
2. Performance on the trail does not always correlate with fitness, health, and mental attitude.
3. Successful performance during a hike is a product of planning and mental discipline.

BACKGROUN INFORMATION

Personal conditioning involves mental attitude, physical fitness, and the maintenance of a healthy body. It is important to realize, however, that health, fitness, and mental attitude do not necessarily produce the required endurance, strength, and enthusiasm necessary for a good on-trail performance. On the other hand, a person suffering from a cold can perform well as a part of the group if he/she has the proper attitude and a body that is fit.

The goal of personal conditioning for the individual is to be able to enjoy the hiking experience within the parameters of the group. Can he/she keep up without personal stress? If a hike is well-planned and all participants are properly prepared physically and mentally, the chances of success are greatly enhanced.

During the hike itself, there are additional considerations. For example, the pace of the hike must be set with the slowest hiker in mind. If he/she has been permitted to participate, the pace must be within his/her physical limits. Especially at the beginning of a hike, the pace should be slow. This will avoid muscle cramping in the shins and calves that may ache for hours or even days.

There is little agreement on what the hiking pace should be. Some manuals suggest two miles per hour, with an additional hour allowed for every gain of 1000 feet in elevation. Another suggestion is to allow hikers to rest 10 minutes out of each hour. It is not desirable, however, to take the 10-minute breaks all at one time. Some authorities state that a rest of more than 5-7 minutes is non-productive. Actually, the number and lengths of stops must be determined by the condition of the group, the terrain and the amount of weight being packed by the group.

Rest stops are appropriate times to make observations concerning the area, to describe some of its history and to make weather observations and predictions. Students and their leaders should control any urge to "hurry up and get there." Rest stops should be used by all members of the group to make adjustments that will increase their comfort. They may wish to pull up socks, add or remove clothing, relace boots, or adjust shoulder straps.

BACKGROUND INFORMATION (Cont'd.)

When hikers are climbing a hill, a slow but steady pace is superior to a "rush and collapse" approach. A hiker will develop heel blisters when climbing if his/her heels moves too freely in his/her boots. Walking flat-footed will decrease the chances of developing heel blisters and also reduce stress on muscles and tendons.

Hiking downhill sounds easier than climbing, and it is. However, it, too, has dangers. Most injuries occur on downhill return trips when hikers are fatigued, become careless, or attempt to rush in order to reach home more quickly.

Different muscles are used when hiking downhill. Also, blisters have a tendency to pop up on toes if they jam against the boot tip and on the foot pads if feet slide forward with each step. A good fitting boot, proper socks, and a steady, controlled pace are the hiker's best protection. Whenever the first sensation of a "hot spot" occurs, he/she should apply moleskin or molefoam as soon as possible. Most experienced hikers prefer the felt-type moleskin.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe trail performance and explain that it does not necessarily correlate with fitness, health, and attitude.
2. Explain why their individual performance is critical to group success.
3. Describe factors to be considered in determining the hiking pace.
4. List the adjustments hikers should make when resting to achieve personal comfort.
5. Describe special problems in hiking uphill and downhill.

"DOING ACTIVITIES"

Students will be able to:

1. Evaluate themselves with regard to all aspects of personal conditioning and predict their on-trail performance.
2. Choose a partner with whom to make a boot check to prevent blisters while hiking.
3. Evaluate the hiking goal for each day and set a pace to be agreed on by the group.
4. Determine the group hiking order for class members.

CONCEPTS

1. Weather conditions dictate clothing needs.
2. Being away from home and camping in the wilderness may be a frightening experience for some people.
3. Hiking conditions change with the seasons.
4. Rules and regulations are important when in the out-of-doors.

BACKGROUND INFORMATION

To assure a safe backpacking trip, the teacher should follow these simple rules:

1. Discuss the nature of the hike with the group before leaving. Be sure that students are aware of the type of trip and of what physical demands will be made of them.

2. Discuss all rules and regulations that apply to group activities on the trail and in camp.

3. Be sure that all members of the group have clothing suitable for the hike and for possible adverse weather conditions.

4. Call the local U.S. Forest Service Office or other appropriate agency to vertify weather forecasts, fire regulations, trail and camp conditions, and water availability.

5. Before class members leave on the trip, instruct them to notify family members and friends as to where they are going, what route they are taking, how many are in the party, when the group is likely to return, and other pertinent data. Also register this information with the U.S. Forest Service Office in the area of the hike, and call the office when the group returns.

6. Instruct students not to drink water on the trail unless they are sure of its cleanliness.

7. Also instruct class members to:
    a. Avoid tasting unfamiliar plants.
    b. Avoid touching poison oak and stinging nettles.
    c. Avoid contact with all wild animals. Chipmunks and squirrels may be cute and inviting, but they do bite. The bubonic plaque is carried by fleas living on rodents.
    d. Also, avoid tame animals that are acting strangely or that seem unafraid. Notify local authorities, if possible, of such animals since rabies is a possible cause of such behavior.

BACKGROUND INFORMATION (Cont'd.)

8. Note that the basic equipment necessary for safety on the trail includes:
    - An adequate first aid kit.
    - Matches in a waterproof container.
    - A reliable watch.
    - A flashlight with extra bulb and batteries.
    - An adequate supply of water in proper containers.

9. If a campfire is planned, be sure it is situated in a safe place, well away from any combustible materials. When the group breaks camp, be sure the fire is properly extinguished and is dead out.

Do not frighten students when warning them of possible dangers. Trail and camping hazards can be discussed in a positive manner to avoid reinforcing fears held by group members.

CURRICULUM OBJECTIVES

Students will be able to:

1. Dress properly for the anticipated weather conditions.
2. Identify the rules and regulations for hiking in the wilderness.
3. Plan acceptable group regulations so that each person will know what is expected of him/her.

"DOING ACTIVITIES"

Students will be able to:

1. Check the weather forecast and determine what clothing will be needed in view of the expected weather conditions.
2. List the fears expressed by students before they spend a night in the wilderness. Discuss these fears with the whole group.
3. Check with local agencies for information concerning such matters as fire regulations, trail conditions, and availability of campsites and water.
4. Discuss situations which could occur during the outing and then decide on the appropriate rules to govern them.
5. Participate in role simulations of stressful situations which might occur on the trail. For example, students may act out the events which would take place if a member became seriously ill or was injured on the trail.

CONCEPTS

1. Some areas are more hazardous for hikers than others,
2. Help is available if the hiker knows where to find it.
3. Some trails are more safe than others.
4. Sometimes hikers find themselves in areas where there are no trails.

BACKGROUND INFORMATION

On a group backpacking trip, a reliable adult should be at the head of the column of hikers and another should be assigned to the rear to watch for problems and to keep the members of the group together.

Each hiker should be within sight or sound of other members. Individual students should never wander off alone. A party of four is considered the minimum for safety. If any person is hurt, the three other hikers might assist that person back to the road. If a person is more seriously hurt, one member should stay with the person while the others seek help. It is unwise for one person to seek assistance alone unless it is absolutely necessary.

Falling rocks are a serious hazard in mountainous areas and demand every precaution. Slopes and steep gullies are often bombarded by rocks loosened by wet or dry weather conditions and by temperature changes.

Students should be warned not to roll objects such as rocks or logs downhill. They also should never throw rocks or carry pointed sticks.

Hikers should stay on the trail and obey the posted signs. Short cuts are often hazardous and cause erosion.

If there are not trails, the group should stay in line to minimize the impact on the area, except on hillsides where a zig-zag route is preferable. Hikers should be wary of loose rocks or slick grass. The members of the group should never run nor hurry. They should beware of tree branches crossing the trail; these may snap back and hit other hikers as they pass. In addition, students should avoid deep banks, cliffs or ledges, deep ravines, and overhanging banks. The students should never hike barefoot because sharp rocks, thorns, and broken glass are common hazards.

When crossing a stream, hikers should watch for slippery rocks and carry their packs unbuckled so that the packs can easily come off if there is a fall. Some people like to use a tree branch as a support staff when crossing streams. Members of the group should avoid fast-flowing streams or log crossings when logs are placed inse-

BACKGROUND INFORMATION (Cont'd.)

curely. The least hazardous route is the most desirable.

To keep the party together at all times, allow the slowest hikers to set the pace and to take turns as to who is in the lead. Maintain a pace and follow a route that is well within the ability of every member of the party.

Fatigue may often be the cause of an accident. Frequent eating of light snacks or candy will extend the endurance of the group. Be sure to stop early enough to allow sufficient time for the return trip and turn back whenever safety or time comes in question. If the students are on an overnight hike, stop early enough for them to make camp in the daylight.

Mountain climbing is a highly technical sport and requires extensive training and specialized equipment. It should not be attempted by the average hiker unless he/she is under the guidance of an experienced mountaineer. Never underestimate the potential danger in the mountains. It is easy to get into places from which you may not be able to return without help. The group should avoid steep slopes that end in rocks or snowy cliffs. It takes experience and proper equipment to cross such terrain safely.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize hazardous trail conditions.
2. Know where to go for help.
3. Identify which trails are best for the group.
4. Know the common safety practices to be observed on the trail.

"DOING ACTIVITIES"

Students will be able to:

1. Conduct a survey of the proposed hiking area and list all possible hazards.
2. Locate and list all sources of help in a proposed hiking area, including names of agencies or persons, their addresses, and emergency phone numbers.
3. Conduct a survey of the trails which may be used and determine which is the best. Why did you select it?
4. Watch for any natural features (streams, steep slopes, overhangs, etc.) that might present safety hazards, and determine if alternate route are available and necessary. Also consider other precautions to assure group safety.

CONCEPTS

1. Safe travel requires being prepared for a variety of weather conditions.
2. Weather in mountain climates can quickly change from sunshine to fog, thunderstorms, or even snow.
3. A sudden change in weather conditions can mean changes in outing plans, including which route to take and the time and distance to be covered.

BACKGROUND INFORMATION

Good weather contributes to the success and safety of a trip. On the other hand, bad weather can confuse the members of the group and turn what might have been an easy trip turn into one that is tough or even disastrous. Before setting out on a hike, check the long-term weather reports, and be prepared for sudden changes in conditions.

Mountain weather is extremely volatile. A day may start out to be sunny and warm; but, by afternoon, a severe thunder and lightning storm may occur.

Fog, heavy rain, snowstorms, and strong winds can cause a group to lose its way or may prevent the group from completing the hike as planned.

Hikers should stay out of the mountains when conditions might produce avalanches, or blizzards, fog, high winds, or other extremes in the weather. Both sunburn and snow blindness can be very serious injuries. When hiking in the snow, be sure to wear proper goggles and to use sun cream for protection in high altitudes, even on slightly overcast days.

Thunderstorms create many problems. In the event of a storm, do not continue to hike upward toward exposed ridges. Avoid high, open areas and exposed lone objects where lightning might strike. Stay out of canyons and gullies to avoid flash floods.

Hot and dry weather can also be dangerous if hikers are not prepared. Always carry adequate supplies of water with you. Check with the U.S. Forest Service regarding the availability of water along the route before you begin the hike and plan the use of supplies accordingly.

In hot weather, slow your pace and make frequent rest stops. Take advantage of the availability of shade, and drink enough water to maintain body fluids. Thirst alone is not a reliable guide to your need for water. Drink more than your thirst would suggest to guard against dehydration. Hot, dry climbs are hard on the body, and you should drink a gallon or more of water each day. High winds dry out the exposed areas of the body and usually create a high fire hazard in the wilderness around you.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize that different weather conditions have varying effects on their safety in the out-of-doors.
2. List alternative plans for their outing in the event of changing weather or trail conditions.

"DOING ACTIVITIES"

Students will be able to:

1. Write a description of a different weather condition on each of a series of cards. Examples:
    - Ground fog
    - Rain
    - Snow to 3,000 feet elevation
    - Wind speeds up to 40 miles per hour
    - Temperatures in the 90's (fahrenheit)
2. At random, select one or a combination of cards and decide if an outing should be attempted; and, if so, what precautions should be taken.
3. As a classroom exercise, check long-range and weekly weather forecasts to determine whether or not a prepared outing should be attempted or plans should be changed.
4. During a hike or after returning home, consider with the entire class the following:
    - Were your plans sufficient to cope with the weather conditions?
    - Would you have been prepared if a major change in the weather had taken place?

HERE'S AN INTERESTING WEATHER CONDITION. REMEMBER WE ARE TO DECIDE IF AN OUTING SHOULD BE ATTEMPTED. OK, HERE WE GO! ONE DOZEN EGGS, ONE QUART MILK, DOG FOOD...... WHOOPS.. ER.. A.. I SEEM TO HAVE PICKED MY SHOPPING LIST.

CONCEPTS

1. Proper precautions must be taken when selecting a safe site for a campfire.
2. Fire regulations vary from season to season.
3. The campfires should be dead out when it is not longer needed or cannot be attended.

BACKGROUND INFORMATION

A fire site should be on level ground, sheltered from high wind and away from heavy brush, logs, tree trunks, overhanging branches, or any other fuel. It is important that the ground be cleared down to mineral soil in a circle at least 10 feet across. Keep the fire small, and never leave it unattended.

When you break camp, put the fire dead out. The best way to do so is to drown it with water, stir the coals, and drown it again. Check the coals to detect any remaining warmth. If there is any warmth, drown the coals once again. It is important that you know the fire rules for the area and for the time of the year. In many hiking areas, open fires are no longer allowed. Therefore, all fires for cooking and heating must be limited to these in approved stoves. Never smoke while hiking. It is best that you do not smoke at all in the back country.

CURRICULUM OBJECTIVES

Students will be able to:

1. Select the best available locations for campfires.
2. Describe current fire rules and regulations.
3. Use the proper methods for extinguishing campfires.

"DOING ACTIVITIES"

Students will be able to:

1. Conduct a survey of the area; and, as a group, decide upon the best location for the campfire. Students should also be able to give the reasons for the choice.
2. As a group, plan the equipment and heating needs based upon current fire rules and regulations.
3. Before the actual outing, practice proper procedures for building fires and methods of extinguishing them.

CONCEPTS

1. Each person has different physical, mental, and emotional limitations.
2. A person's abilities and limitations should be recognized by the members of the hiking group so that they are fully aware of what the group can and cannot accomplish.
3. Certain plants and animals are harmful and should be avoided.

BACKGROUND INFORMATION

Before leaving on a hiking trip, the group members should ask their doctors to evaluate their physical abilities. Each member should then honestly report on his/her capabilities and limitations. If a person has a serious health problem, a doctor's written statement approving his/her participation in the hike should be obtained. Emotional and mental attitudes should also be considered. Backpacking often requires more than physical health. There must be a genuine desire to hike, to reach camp, and to return.

The leader should know the limitations of each member of the group and plan the trip so that the weakest hiker can participate successfully.

Special consideration should be given to those persons who do not have normal physical or mental abilities. For example, there may be a diabetic or an epileptic in the group who requires special medication or who should be observed with added care. If students require special medications, these should be dispensed by an adult member. All medications should be supplied by parents, along with instructions.

Group members should be kept together on the trail, even though they must travel at a slower pace because of the physical limitations of some participants. Discussing these matters before setting out and involving the whole group in helping the persons concerned, can eliminate arguments or problems when hiking.

It is extremely important that poisonous plants or plants harmful to the touch be identified to the entire group. In particular, everyone in the group should be able to recognize on sight poison oak and stinging nettles.

The leader should also discuss harmful animals which may be encountered, explaining how to recognize and avoid them. In particular, students should be warned about rattlesnakes. They should be advised to watch where they step, and where they sit and place their hands. Students also should learn to be alert to the sound of the warning rattle.

BACKGROUND INFORMATION (Cont'd.)

Preventive measures for dealing with mosquitoes, ticks, and spiders should be discussed. Usually, a generous application of a strong insect repellent will be adequate protection.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize the physical and/or mental limitations of themselves and of the group.
2. Describe any special precautions that should be taken in view of group limitations.
3. Recognize and avoid harmful plants and animals.

"DOING ACTIVITIES"

Students will be able to:

1. Complete a "health form" with their nurse or doctor before leaving on the trip. Discuss their physical abilities and mental attitude with the group. The group should then prepare a brief report identifying the abilities and limitations of each member.
2. Study books on plant identification before starting on the hike. During the trip, identify poison oak and stinging nettles.
3. Do research on the rodents and reptiles most often encountered in the San Gabriel Mountains. During the hike, listen for sounds of these animals and learn to avoid them where possible, especially rattlesnakes.

DR. SMART
THAT "TICKER" IS MY WATCH IN MY POCKET.

DR. SMART: I FEEL YOUR "OLD TICKER" IS A LITTLE WEAK.

CONCEPTS

1. Being prepared for the most serious emergency can sometimes make the difference between survival and death.
2. Different climatic conditions, the location of the outing, and the time of year will distinctly affect what items are needed in a survival kit.

BACKGROUND INFORMATION

Survival kits should contain items which will help to assure your survival if you become lost or stranded in the wilderness. A basic kit should contain extra food and water rations, matches, a flashlight, and some means for signalling for help.

Emergency rations can be made from a mixture of trail mix and hard candy. Such a sweet, high-energy mixture will help your body maintain its heat and will be especially helpful if you are soon rescued. Longer-term foods are necessary if it will be days before you are found. If you are hiking in dry mountain areas, carry an extra canteen of water.

Some way of starting a fire should be included in every survival kit. Waterproof and/or windproof matches are probably the best resources. You should also include fire-making aids for use with wet wood; for example, two short candles or canned heat can be used for this purpose.

An emergency source of light is also necessary, particularly if a person is hurt during the night. A spare flashlight and an extra set of batteries may be used for this purpose as well as for signalling.

A whistle and metal mirror can be used to signal for help. The whistle should be shrill-sounding so that it can be heard over long distances.

CURRICULUM OBJECTIVES

Students will be able to:

1. Describe the basic human needs for survival in the wilderness and their priority under different conditions.
2. Develop a survival kit to meet their basic needs according to the time of year, weather conditions, and trip location.

"DOING ACTIVITIES"

Students will be able to:

1. Develop individually a list of items to be included in a survival kit designed for use in a particular area during a certain time of the year. Class members could then be divided into small groups to produce the actual kits.
2. Using the above kits, demonstrate the use of each item, explaining, how, when, and why it should be used.
3. Students should be able to list two or more uses for every items in their packs and kits.

CONCEPTS

1. It is best to remain calm and to stay in one place when a person is lost.

2. When a person is lost, the basic problem is how to stay alive long enough to be found.

3. Distress signals or calls for help may hasten the rescue efforts.

4. Knowledge and specific survival practices can make the difference between survival and death.

BACKGROUND INFORMATION

When lost, a person should keep a clear head and avoid panic. Most accident problems occur because of a person's mental attitude rather than because of physical danger. A lost person must try to determine his/her approximate location. He/she should stay in one safe place. First locate or build a shelter. It should be at a site near a water supply. Later, try to determine the food resources available. It may be necessary to reduce rations. A person who is lost should collect a pile of green brush and be ready to put it on the fire to produce smoke signals in case an airplane is flying nearby. It is important to keep a fire burning all night.

Before beginning on a trip, each person in the trail group should practice survival procedures. This could make the difference between being safe and being in danger.

Each person should know how to:

1. Locate or build a shelter.
2. Maintain normal body temperature in extremes of heat and cold.
3. Make a fire under all conditions.
4. Find water.
5. Use native plants and animals for survival (requires skill and knowledge).
6. Demonstrate active and passive methods of attracting attention.

For specifics on survival techniques, consult books listed in the reference section.

S.O.S. signals should be used periodically and especially when the person who is lost believes other people are close enough to observe or hear the signals. If you are alone and unsable to send for help, signal by whatever means is available. The universal call for help consists of three signals in rapid succession, repeated at regular intervals, such as three short flashes of light, three blasts on a whistle, three puffs of smoke, or three fires.

If for some reason you must travel, walk downhill and follow streams. Stay in open spaces as much as possible so that you can be seen from the air.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate how to locate a safe, highly visible location which offers shelter while awaiting rescue.
2. Explain that different conditions require different priorities for survival (weather, terrain, injury, water, food, etc.).
3. Demonstrate three methods of signalling for help.

"DOING ACTIVITIES"

Students will be able to:

1. Scout an area on the trail to determine where, if lost, you would await rescue. Discuss what factors were considered in making the selection.
2. Prepare a series of cards, each listing a different facotr that a person should consider if lost. Examples include, weather, terrain, equipment, injury, assistance, shelter, and supplies. Several cards could be used to cover various conditions related to each factor. For instances, a series of cards on the weather could list rain, snow, heavy wind, overcast, or bright sun.
3. Draw one card at random for each factor and decide, on an individual basic, what each student should do.
4. Participate in a class discussion to decide on the best plan of action.
5. Using various materials, make or send visual and sound S.O.S. signals under different conditions, such as in variations of weather and terrain.
6. Given the area of the eventual hike, create on paper a survival kit for that area, including all the items that a camper would deem absolutely necessary. Present a rationale for selection of the items that were included.

PUBLIC TELEPHONE

NO MON, I'M NOT LOST - JUST CALLING BECAUSE THE RATES ARE CHEAPER WHEN CALLING ON THE WEEK-ENDS.

CONCEPTS

1. Fire is always dangerous, but it may be a greater hazard under certain conditions.
2. Information on fire hazards is readily available, and hiking should be avoided under extreme conditions.
3. Panic is the leading factor in fire-related fatalities. If a hiker remains calm, he/she will increase his/her chances for survival.

BACKGROUND INFORMATION

Before going on a hike, ask the U.S. Forest Service what fire hazards exist. In the dry San Gabriels, the danger of fire becomes extreme in the early autumn when hot winds often blow off the desert and into the foothills. When conditions produce a high fire hazard in a specific area, that area should not be used for hiking or backpacking.

If a hiker is caught near a fire, he/she should stay calm and not run blindly away. If he/she becomes exhausted, the hiker is much more likely to be a victim of heat stroke and also may overlook a safe refuge. The person should try to move into bare or burned ground if possible. The hiker should not run uphill away from the fire unless he/she knows of a safe refuge in that area. Instead, the hiker should move across the slopes out of the path of the fire and work his/her way down the slope toward the back of the fire. The hiker should not attempt to run through flames unless he/she can clearly see behind them. This generally means that the flames are less than five feet high and no more than five or ten feet deep at the back. Flames on the flanks of the fire wall may be low enough to step or run through to the burned ground beyond.

When conditions become severe, the hiker should use every possible means of protection from radiation. On bare ground, the person should cover himself/herself with dirt or sand if possible, or use wheel ruts, depressions, or large rocks for protection. If the hiker stays put, he/she may have a fair chance of survival. The person also can take refuge in ponds, running streams, or culverts, but should avoid elevated water tanks. He/she should cover the body with a wet blanket, sleeping bag, or tent.

Three basic guidelines are to:

1. Select an area as a refuge where there is the least amount of combustible material.
2. Use every means available to protect yourself from the radiation of the flames.
3. Remain calm; do not panic.

CURRICULUM OBJECTIVES

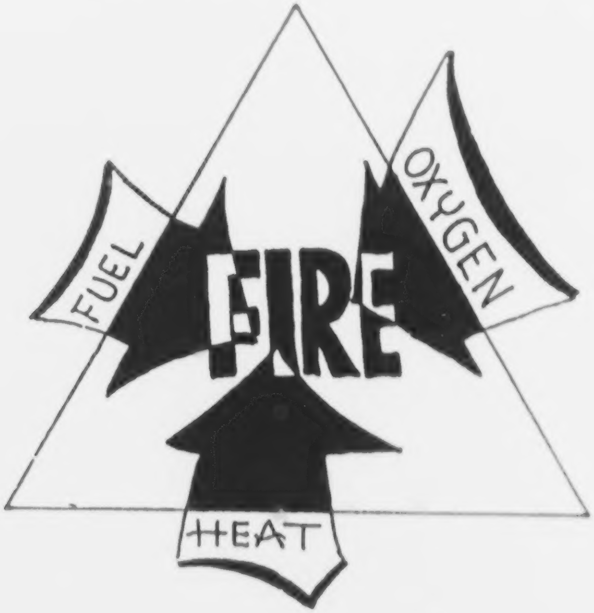
Students will be able to:

1. Identify the factors that create hazardous fire conditions in Southern California.
2. Explain how to obtain fire hazard information.
3. Recognize areas that could afford some shelter from a brush fire under specific conditions.

"DOING ACTIVITIES"

Students will be able to:

1. Study the fire triangle and determine what natural conditions fit into the three sides of the triangle. Consider how these conditions change throughout the year.
2. Study weather and other conditions, such as accessibility, vegetation, and time of year, to determine fire hazards at a given time. Compare their findings with the official U.S. Forest Service forecasts.
3. Prepare a series of cards, listing on each various conditions, such as temperature, humidity, wind, time of year, height and kind of vegetation, and number of persons in their party.
4. At random, take one card from each set of factors, examine a specific area, and decide what should be done under the particular set of conditions listed on the cards.
5. As a class, decide upon the best plan and compare results. Change the conditions by drawing more cards. Would you choose the same or a different plan for survival?



CONCEPTS

1. Shelter under extreme conditions is of more immediately importance than food or water.

2. Maintain normal body temperature in extremes of heat and cold.

3. When natural shelter is not available, survival may depend upon construction of a temporary emergency shelter.

BACKGROUND INFORMATION

Exposure to the elements is far more dangerous than being without food or water. In cold, wet weather an exposed person will begin to suffer severe bodily harm if shelter is not found within three hours. A person can live for three days without water and three weeks without food; but, if the body loses its necessary 99-degree temperature, death is imminent.

If you are lost in the wilderness or encounter cold weather for which you are not prepared, you must immediately begin to seek out adequate natural shelter. Once the body is fatigued and chilled, hypothermia may readily develop. Therefore, at the first sign of being lost and cold it is important that you find a shelter that gives your body protection from windy, cold, and wet weather.

If a cold, windy rainstorm suddenly occurs and you are not in in a position to set up camp, begin the search for a shelter. It is important to stay out of the wind, to move away from exposed ridges or open areas, and to keep yourself as dry as possible.

In the Southwest, a critical survival concern is the maintenance of body temperature within a normal range when a person is exposed to hot and dry conditions. The key to survival is to find shelter from the sun and to decrease body activity to retain normal body moisture. Treatment for heat stroke and heat exhaustion is described in the section on First Aid.

Shelter may be found on the left side of mountains behind trees, large rocks, or other natural barriers. Watch for natural shelter in rock formations, caves, dense evergreen forest, or large logs.

If natural protection is lacking, construct a lean-to with poles and evergreen thatching, or make a windbreak of evergreen boughs by sticking them into the ground.

Do not camp or make a shelter in a gulch or ravine bottom because sudden storms may cause flash flooding that could wash you out.

To a certain degree, the need for shelter and the desire to be found represent opposite goals. As a person moves to places

BACKGROUND INFORMATION (Cont'd.)

out of the wind and out of the rain, he/she also moves out of areas in which sightings can occur. It is important, therefore, to leave signs of your presence that can be observed. Persons have been found in the mountains or the deserts because they left articles of clothing behind that were not needed, but that could be identified and easily discovered.

Once shelter has been found, construct a fire if possible; climb into your sleeping bag; and, if available, drink warm, sweetened liquids. These procedures will help stabilize your body at its required temperature.

CURRICULUM OBJECTIVES

Students will be able to:

1. Recognize that exposure to the elements is more dangerous than hunger or thirst.
2. Demonstrate an ability to take advantage of natural shelter.
3. Demonstrate the proper procedures to maintain body temperature.
4. Use available materials to construct emergency shelters.

"DOING ACTIVITIES"

Students will be able to:

1. Write a short report explaining how the body reacts to exposure and what emergency steps can be taken to prevent death.
2. Make up a series of cards, each listing a different weather condition at different locations. Working in terms, locate a natural shelter or materials from which to construct a shelter that would offer protection from the various weather conditions.
3. On a hike, point out possible natural shelters, and discuss in what weather conditions the shelters could best be used.
4. Construct adequate shelters, using available materials. This can be done by preparing a drawing or a model to minimize the impact on the body area.
5. Make up a list of those things which students need to survive.

CONCEPTS

1. Topographic maps show the surface contours of the ground.

2. Topographic maps are printed in scales of several sizes, the most common being the 7½ and 15-minute series.

3. Maps are drawn on true north, and north is located at the top of the map.

4. Map symbols give a picture of the landscape.

5. Contour lines mark intervals of elevation above or below sea level; the contour interval scale is recorded in the bottom margin.

BACKGROUND INFORMATION

Maps come in many shapes, sizes, and forms and contain a variety of information. Road maps show freeways, roads, towns, campsites, and tourist attractions. But these maps are of little use to the hiker, other than in the identifying the nearest towns.

The basic sources of back country travel information are topographic (topo) maps. These maps can be acquired from the United States Geological Survey Office in Denver, Colorado, and from backpacking shops. The maps show the surface contours and are printed in scales of several sizes. The most common are the 7½ and 15-minute series. The series indicates how many degrees wide and long is the area covered by the map. One degree equals 60 minutes of angle. Consequently, a 7½-minute map covers 1/8 degree of latitude and 1/8 degree of longitude.

One can find the location of a land area by the latitude and longitude printed on the borders of the map. Range and township lines are also printed along the borders. These lines form a grid system which is used in land surveys.

The imaginary lines are placed exactly six miles apart. The north - south lines are range lines. The east - west lines are township lines.

When you read a map, always spread it out with north at the top. This places east to the right, west to the left, and south to the bottom. Maps are drawn on true north - south lines which are parrallel with the longitudinal lines of the Earth. This north differs from the magnetic north indicated by a magnetic compass.

The true pole and the magnetic pole are not, unfortunately, located in the same place. Magnetic north is near Hudson Bay. Therefore, when using a compass, a person must compensate for the difference. This

BACKGROUND INFORMATION (Cont'd.)

difference is called the magnetic declination and will be discussed in another section.

In looking at a "topo map," a person sees that it is covered with symbols detailing the landscape features and human-made features in the area covered. The most important features supplied by a "topo map," however, are the contour lines. These are brown lines which mark intervals of equal elevation above sea level. Every point along each line represents the same elevation. A darker, more prominent contour line at regular intervals will note the elevation. Contour intervals may vary from map to map. Some maps may have an interval of 10 feet while others may be 20 feet. The closer are the lines, the steeper is the slope.

Therefore, where contour lines are far apart, the slope may be gentle; and where they are very close together or almost running together, they depict a very steep or almost cliff-like contour. In places like these, the hiker knows the ground rises quickly and will take a great amount of energy to climb. Contour lines that form concentric rings indicate a hill. Small lines extending inward from the rings indicate a depression or small valley. If the contour lines form a point outward, that denotes a ridge. If the V points into the contour rings, it denotes a valley.

Other symbols which usually appear on a map represent water features in blue and vegetation features in green.

If a hiker can understand the meaning of contour lines and symbols on a map, he/she can plan a route of least resistance. It is also important for the hiker to consider seasonal or geologic changes and to determine whether there has been a landslide, flood, or other change in the area since the map was printed.

In the field, maps are subject to wear and are exposed to moisture and dirt. If there is too much moisture, a map can quickly become useless. To protect your map, you may do several things. For example, you may buy plastic sheeting at a stationery store or you may purchase clear shelf paper at a low cost. An artist's fixative can be sprayed on the map or you may buy a commercially produced map case.

On a windswept ledge, it is easy for a gust of wind to carry your map away. This could be serious; and, to prevent such an incident from happening, fold your map accordian-style. This enables you to read the part with which you are concerned without unfolding the entire map.

CURRICULUM OBJECTIVES

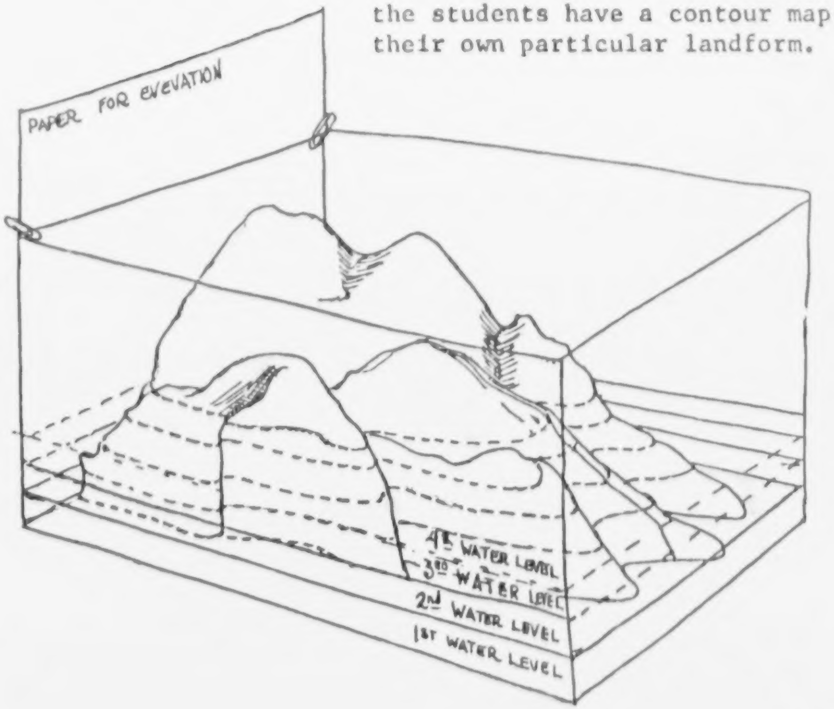
Students will be able to:

1. Explain what the symbols represent on a sample topographic map.
2. Look at a topographic map and discuss all the land formations indicated by contour lines.
3. Plot a route of "least resistance" between two points on a topographic map. Explain the reasons for your choice.

"DOING ACTIVITIES"

Students will be able to:

1. Using topographic maps of different areas, explain to other class members the following:
    a. What the symbols represent.
    b. What the contour lines depict.
    c. What information is given in the margins.
    d. Why they chose a specific route between two points.
2. Make an imaginary topographic map, using all the symbols and contour lines. This activity will make students more aware of map symbols and help them to become accustomed to map language.
3. Place a clay land form in the bottom of a plastic shoe box. Now poor water into the box, measuring approximately ½" from the bottom on clay form. Mark the interval on the clay form. Transfer this interval line on paper. Add more water, mark another interval on the clay form, and then transfer that interval line to paper. Continue the process until the clay form is under water. Now the students have a contour map of their own particular landform.



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CONCEPTS

1. Early compasses consisted of a lodestone attached to a floating stick.
2. Modern compasses are equipped with different measuring devices that can measure bearing to the exact degree.
3. Compasses can:
    a. Be oriented to magnetic north.
    b. Point out specific bearings.
    c. Be used as protractors to find bearing from a map.
4. True north and magnetic north are not in the same location.
5. The angle of declination differs from place to place and must be adjusted on the compass.

BACKGROUND INFORMATION

A few thousand years ago, Chinese scholars discovered the attractive power of a certain ore. The Chinese used it to make primitive compasses by attaching a piece of lodestone or magnetic rock to one end of a stick floating in a wooden bowl.

This is basically how modern compasses work. A small needle is suspended on a pinpoint, with one end of the needle always pointing north. The compass housing consists of a revolving dial and a transparent plate that contains an arrow which points to north on the dial. This arrow is called the orienting arrow.

The dial is marked from 0 to 360 degrees. Zero is also 360 degrees. Moving clockwise, the compass reads east 90 degrees, south 180 degrees, and west 270 degrees. By aligning the orienting arrow on the dial with the magnetic needle of the compass, you orient the compass to the magnetic north. Along the sides of the transparent base plate are ruled figures--metric and non-metric - for making measurements on a map. The functioning unit of the base plate is the direction of a travel arrow.

Using the different parts of the compass together, a person can determine:

1. Where north is and thereby orient himself/herself to other basic directions.
2. The bearing of any objective from any given location.
3. Bearings from a map by using the compass as a protractor.

To find the object from your bearing, first place the compass in the palm of your hand and close to your chest with the direction of the travel arrow pointing away from you.

BACKGROUND INFORMATION (Cont'd.)

The compass should not be near any other metallic object (e.g., wristwatch) since this might throw off the reading.

Suppose you wanted to find in which direction is bearing 140°. Turn the bearing dial to 140 degrees to line up with the directions of the travel line. Now turn your whole body around until the magnetic needle lines up with the large N on your compass dial. Do not forget to keep your palm in position as an extension of your chest. You should be pointing in the direction of 140 degrees. All you need to do is to follow this bearing and to check it from time to time.

To find the bearing from a map by using the compass, first place the edge of the compass so it runs through the starting point and the destination point. Make sure the direction-of-travel arrow is pointing in the direction you will be traveling. Now turn the orienting lines inside the dial to lay parallel with the meridian lines. This should align the north and south lines of the compass parallel to the north/south lines of the map. Now you have a bearing which should read off the direction of the travel line. If you want to follow this bearing, line up the magnetic needle with the large N on the compass dial. Now you are ready to proceed except for one minor adjustment.

Up to now, we have assumed that the magnetic needle pointed to true north. But, in reality, it is pointing to magnetic north, which is located near Hudson's Bay. The angle between the direction of true north and the direction of the compass needle is call the declination.

The angle of declination differs from place to place and must be adjusted accordingly. To adjust, you must first find how great the declination is from the map you are using. At the bottom of all maps there is a diagram showing the angle of declination. If the diagram reads 6 degrees west, that would mean that the magnetic north would pull your compass needle six degrees to the left of true north. Now you are ready to compensate for this pull.

Assume that the bearing on the map is 80 degrees and that the declination in that area is 20 degrees west. When the declination is a westerly pull, you must add the declination number to the bearing figure. A good way to remember is to say to yourself "Declination west - compass best." (Remember that things are always "better" when you add something to them.) So, if the true bearing is 80 degrees, add the 20 degrees westerly declination, and the magnetic bearing will be 100 degrees. When the declination is easterly, you must subtract the declination figure from the map bearing.

CURRICULUM OBJECTIVES

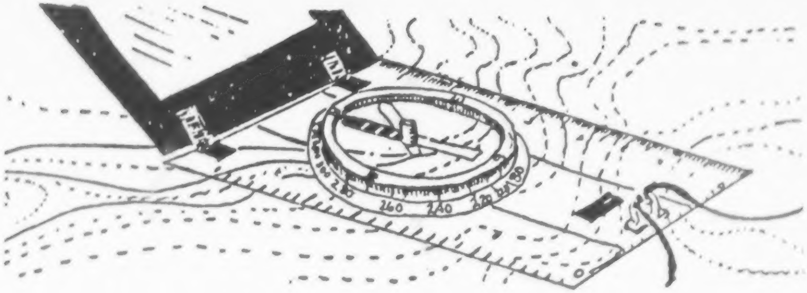
Students will be able to:

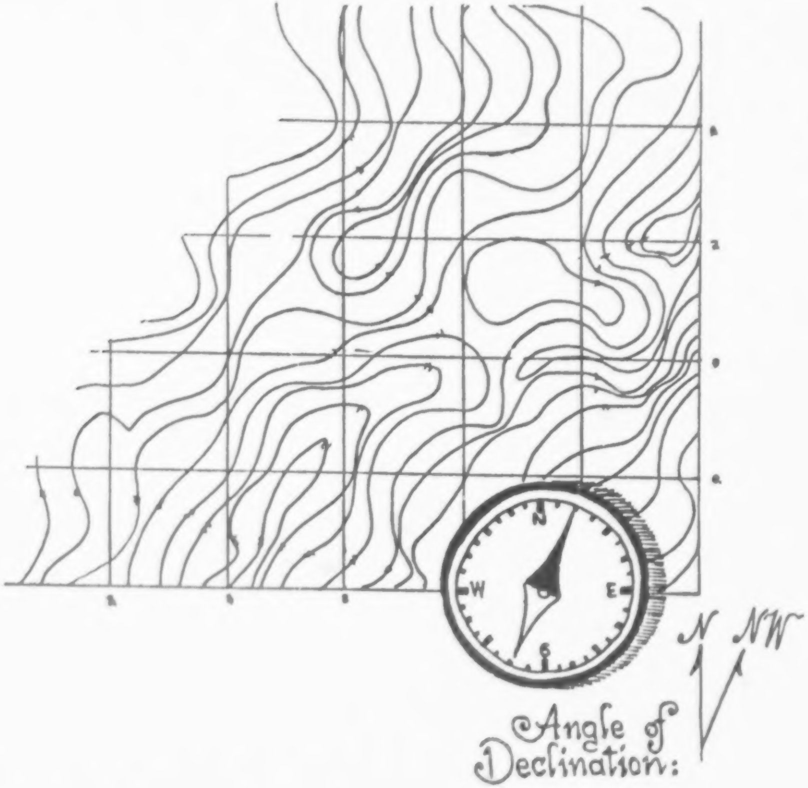
1. Orient themselves to magnetic north.
2. Find a specific location from a given bearing.
3. Find a bearing from a map, using the compass as a protractor. Adjust a compass for the angle of declination.

"DOING ACTIVITIES"

Students will be able to:

1. Demonstrate their knowledge of the compass by finding different locations, given the bearing. The students should be given a list of bearings and then asked to list in what direction they would be traveling.
2. Set a bearing, correct the angles of declination, and orient a map provided for student use.
3. Using a map, a compass, and two given points on a map, find the correct bearing to reach a destination shown on a map. (Adjust for the angle of declination.)





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CONCEPTS

1. Orienteering demands a knowledge of map reading and compass reading as well as common sense.
2. Estimating distance through a process of counting steps must be learned.
3. A good orienteer looks for "hand rails."
4. To widen the security margin is called "aiming off."
5. Attack points are easily identifiable landmarks in the terrain.

BACKGROUND INFORMATION

Orienteering is the skill of finding your way. It demands a knowledge of map reading and development of compass reading skills. Common sense is also needed.

In orienteering, the shortest and easiest route between two points is not always a straight line. Often, it requires good orienteering through unknown terrain to arrive at the destination in the shortest amount of time.

Before undertaking orienteering, the student must learn how to estimate distances through a process of step counting. Each person has a different stride. To determine the length of yours, you will need to practice walking off 100 meters and counting the paces. One pace is a double step, so count every time your right foot hits the ground. After you learn this technique, you can measure a distance on the map and estimate how many paces it will take to cover that distance.

A good orienteer looks at the map to find the "hand rail." "Hand rails" are either man-made or provided by nature. They include such things as small paths, stream beds, clearings cut for power lines, or a fenced field.

Suppose you want to go from point A to point B. There are several different possible routes. The first thing to do is to study a map to locate any obstacles that you cannot see from where you are standing. Checking the map helps you to save time and energy by indicating when it is necessary to navigate around obstacles.

Aiming straight to a goal could lessen your security margin. If you end either to the left or to the right of the goal, you will be uncertain as to which way to travel.

A technique to widen the security margin is called aiming off. In aiming off, a person deliberately takes a bearing that will bring him/her to one side of the goal. Then the person can make a correction immedi-

BACKGROUND INFORMATION (Cont'd.)

ately because he/she knows on which side of the goal the error occurred. Aiming off requires a little more walking, but the system pays off by providing additional security.

Another helpful aid in orienteering is the use of attack points. These are any easily identifiable landmarks in the terrain. Attack points can be peaks, cliffs, buildings, or any other prominent features.

Often a decision has to be made as to whether to go around a hill or to climb it. This rule of thumb can help. For climbing every 25 feet of contour, enough energy is expended to run 25 feet plus 100 meters on flat ground. By looking at the map and computing the energy requirements, you can decide whether it is easier to go around or over the hill.

Orienteering is becoming a popular sport in the United States. The sport involves a combination of map and compass skills and cross-country running. A course is set up with control points. The person who covers the course in the fastest time wins. You are now ready to orienteer.

CURRICULUM OBJECTIVES

Students will be able to:

1. Demonstrate orienteering skills by:
    a. Map reading.
    b. Compass reading.
    c. Using "hand rails."
    d. Increasing the security margin by "aiming off."
    e. Using "attack points."
2. Demonstrate estimating distances by pacing off.

"DOING ACTIVITIES"

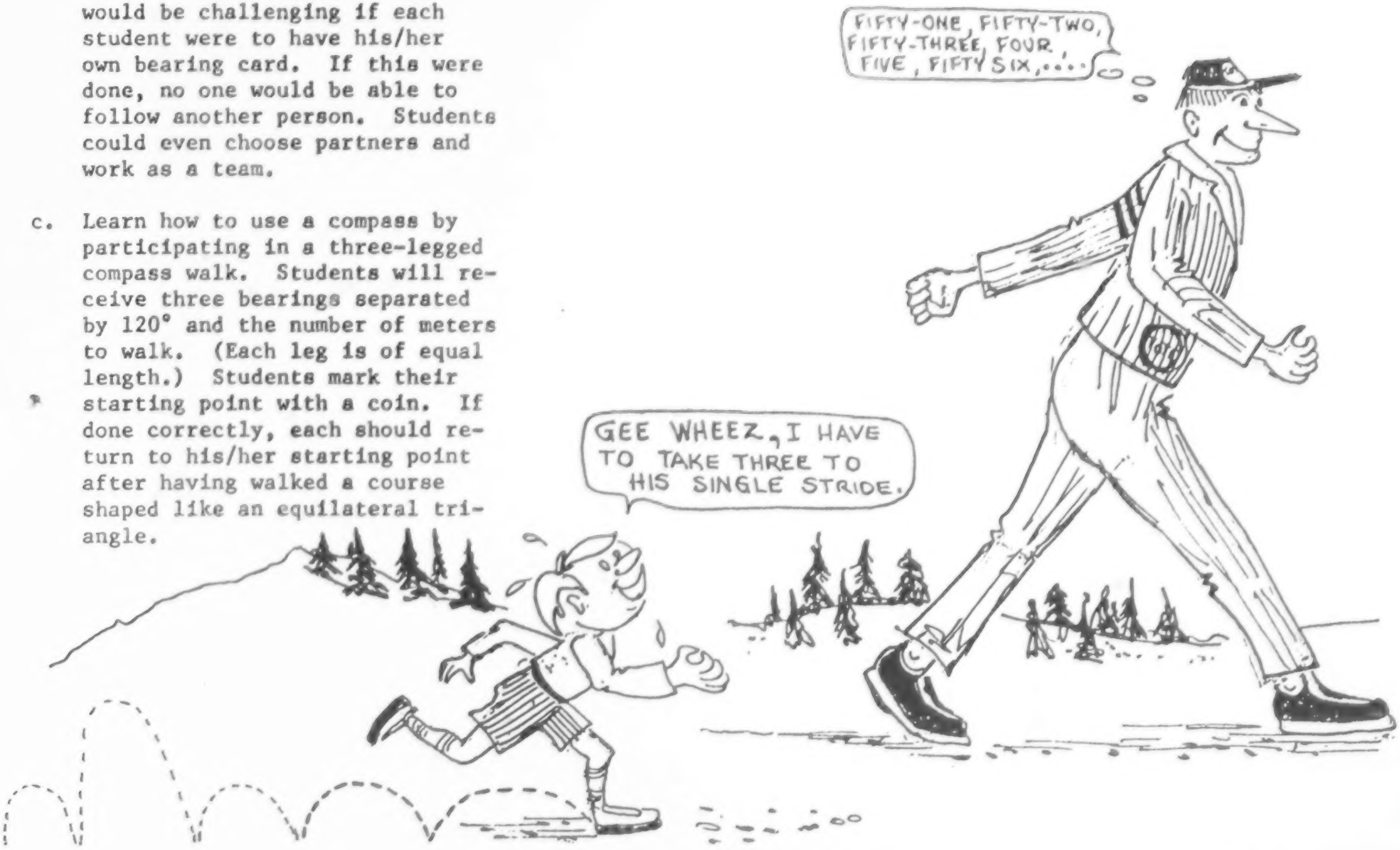
Students will be able to:

1. Determine how many of their paces make up 100 meters. If it is possible to move to an area where there is sufficient open ground, students can participate in an orienteering contest.
    a. Students can be given their first bearing and the number of meters to walk to the next marker. (The markers should be set up in advance.) The students are started separately, and their times are recorded. The person with the best time wins.

"DOING ACTIVITIES" (Cont'd.)

b. Students can also participate in a treasure hunt. The winner would be the first person to find a buried treasure. It would be challenging if each student were to have his/her own bearing card. If this were done, no one would be able to follow another person. Students could even choose partners and work as a team.

c. Learn how to use a compass by participating in a three-legged compass walk. Students will receive three bearings separated by 120° and the number of meters to walk. (Each leg is of equal length.) Students mark their starting point with a coin. If done correctly, each should return to his/her starting point after having walked a course shaped like an equilateral triangle.


FIFTY-ONE, FIFTY-TWO, FIFTY-THREE, FOUR, FIVE, FIFTY SIX, . . .
GEE WHEEZ, I HAVE TO TAKE THREE TO HIS SINGLE STRIDE.

APPENDIX
Printed in USA
WITH MY TOTE, THE WHOLE THING IS AS EASY AS FALLING OFF A LOG! WHOOPS
TOTE

FIFTY WAYS TO USE PLASTIC TRASH BAGS FOR BACKPACKING

1. Wear under jeans as an insulator.
2. Melt snow.
3. Use sections to mix food, such as Indian bread dough.
4. Use as snow slide.
5. Use in kites.
6. Wear as a poncho.
7. Keep feet dry.
8. Keep backpack dry.
9. Hang food.
10. Use as fish sack.
11. Use as signal flag.
12. Wear as a rain hat.
13. Haul trash.
14. Use for fly screen.
15. Use as ground cover.
16. Use as sling.
17. Use as solar water still.
18. Inflate for rescue operation.
19. Use as stuff sack.
20. Wear as thermal boots.
21. Place in stream with food for storage.
22. Transport food.
23. Catch bugs.
24. Use as pillow.
25. Use to collect botanical specimens.
26. Stuff small portion to make a ball.
27. Use as emergency water bag.
28. Use as sleeping bag cover.
29. Use as an insulator in case of shock.
30. Make shade.
31. Use as a tourniquet.
32. Use for slip and slide game.

FIFTY WAYS TO USE PLASTIC TRASH BAGS FOR BACKPACKING

33. Use as triangle bandage.
34. Use to tie splints.
35. Use as restricting band in treatment for snake bites.
36. Use as catch basin for rain water.
37. Use to patch leaking tent.
38. Create privacy by tying several dark colored bags to a tree.
39. Use as a wind break.
40. Use as an emergency signal when placed on the ground and stablized with rocks.
41. Use as vomit bag.
42. Use to make smaller bags.
43. Use in making costumes.
44. Use for plates.
45. Make a litter cover.
46. Use as a wind sock.
47. Use as a trail marker.
48. Use in making puppets.
49. Use as a group flag.
50. Use to separate dirty from clean clothing in pack.

NOVICE NOTICES

16. Tape a few dimes to the inside of the first aid kit for emergency telephone calls.

17. Do not cut your toenails on the day before the hike. One week before is the best time to do so. Walk barefoot for several weeks in advance to toughen your feet.

18. Wear a good grade of tennis or jogging shoes for local mountain trips if you do not have boots.

19. Do not buy your hiking boots by mail order. You must try them on to make sure they are a good fit.

20. Allow plenty of time to order boots so you can break them in before taking a long hike.

21. Purchase hiking boots large enough so that you can wear one pair each of light cotton and heavy wool socks.

22. When sealing boots from moisture, put masking tape around boots, covering boot/sole/joint, to protect stitching.

23. Before your trip, be sure to seal your shoes by spraying them and/or using wax-like sealer. In summer, use the spray because the wax-like sealer stops the leather from breathing.

24. Carry or wear a large kerchief. It can be used to blow the nose, protect the face from dust, and cover the head as a hat as well as a pot holder, hand towel, wash cloth, dish towel, and sitting cloth.

25. Whenever possible, take woolen pull-ons to keep moisture away from your body.

26. Even on hot days, wear light clothing to cover arms and avoid sunburn.

27. Clothing brought for hiking should be based on the "layer system" so that it can be peeled on or off, depending on current temperature.

28. Buy equipment and clothing from army surplus stores rather than pay more at backpacking and camping stores.

29. Do not take glass containers.

30. Carry a rubberized plastic cup for keeping foods warm.

31. Do not use an enameled metal cup--it may burn your lips.

NOVICE NOTICES

1. In certain national parks, national forests, and wilderness and primitive areas, backpackers and other visitors are required to obtain wilderness permits several weeks ahead of time, determine the agency's policy on permits and the maximum group size allowed. Some permits can be reserved, and some are issued on a first-come first-served basis.
2. Be familiar with the hiking area before taking students to backpack there. Be sure to check safety of terrain, a source of water, and to review the campsite, fauna and flora, and teaching areas.
3. Be sure to become acclimatized at the trail head before ascending to or descending from higher elevations. Usually, staying overnight is sufficient.
4. For safety, organize into groups of three or four who will be responsible for each other. If anyone is missing, someone in the group will know immediately who it is.
5. Assume nothing, but be prepared for anything.
6. Check your pack before you leave on the trip to make sure you have all the essential items.
7. Check the batteries of flashlight before your departure.
8. Carry these essentials: a space blanket, and a tube tent 14" x 14" ensolite.
9. Carry a wristwatch; it is useful for finding true north.
10. In snow, you need a strong sunscreen (i.e., glacier cream) and a lip balm. Zinc oxide cream is very good for the lips.
11. For blisters on the trail, bring an antibiotic ointment (e.g., Neosporin or Parabensamine).
12. Do not forget to bring sunglasses and also sunscreen, if you sunburn easily.
13. Practice using a snakebite kit with one hand.
14. Determine whether students taking medication on a regular basis are allergic to bee stings. Take necessary first aid supplies to handle all emergencies common to backpacking.
15. Remember that menstrual cycles are often upset by altitude change; be prepared.

NOVICE NOTICES

32. Before departure, check food supplies to be sure they are adequate.

33. Plan meals so you do not need to use a frying pan.

34. Carry at least two towels for kitchen cleanup, one for "dirty clean" pots and pans, the other for "clean clean" pots and pans.

35. When cooking food, start with a smaller amount of water than you need. You can always add more water.

36. Don't expect water to be available at your destination; carry it with you.

TRAIL GUIDE FOR COMMODORE SUTTER TRAIL/ARROYO SECO

Friday Night - Camp at Switzer Trail Camp. Drive one half mile past the junction of the Angeles Crest and Angeles Forest Highways. You will see a sign marking Switzer Station; turn right and descend to the parking area, about one fourth mile down to the parking lot. You will pack up here for a one mile hike into camp. The going is smooth, so you should be there in about a half hour. There are sufficient campsites and adequate water. Try to arrange this first night so that you arrive at Switzer's as early as possible. It is best not to be out hiking with new campers/backpackers after dark.

Saturday - You can spend some time here exploring the remains of Switzer's Wilderness Resort. The resort was established in 1884; visitors arrived twice a week aboard burros to feast on trout and enjoy the mountain air. The resort featured a tennis court, a croquet court, an open-air dance floor, and a miniature chapel. The chapel was situated above Switzer's Falls, just downstream from the camp. The resort lost its wilderness appeal when the Angeles Crest Highway was completed, and burros were no longer needed for the strenuous trip.

The trail leads across the stream and up the contours along the west canyon slope. You will quickly come to a fenced section, which gives you a view of Switzer's Falls. This portion of the trail is in open chaparral country. After another half mile, the trail begins descending into the east fork of Long Canyon. This is a rather steep descent, but it is very beautiful with the tall spruce and thick oaks. The trail continues on in the cool canyon for another three miles until you reach Oak Wilde Trail Camp. There are picnic tables, outdoor toilets, and the cool water of the Arroyo Seco.

Oak Wilde was a favorite camping area until the 1938 flood. You can see remnants of the road that led to the campground and a few stone foundations. It is a good place to discuss the interactions of humans and nature. You may wish to try the "food chain" exercise from the Ecology section. Map and compass orientation and astronomy lessons are good exercises on the open gravel beds along the stream.

Sunday - This will be a long day, involving several stream crossings and a return to civilization. The trail is mostly flat, but you have 4.5 miles to cover from Oak Wilde. The trail leads through the sandy, gravel beaches of the stream. The trail then turns steeply up the east side of the canyon to get around the Brown Canyon Debris Dam. You will be able to look down on this structure before descending into the canyon again. A discussion on the purposes for such dams would be appropriate. The trail reaches the stream again at the Paul Little Memorial Picnic Area. This is a shady, oak-covered glen. It is a good place for a rest stop. Further downstream, you will pass the small Nino Canyon Picnic Area, and about one fourth mile beyond this the Gould Mesa Picnic Area. Gould Mesa is the last area that can accommodate a large hiking group. It has pit toilets and a nice swimming hole. It is a fine rest stop, located about two miles from the trail end.

TRAIL GUIDE FOR COMMODORE SUTTER TRAIL/ARROYO SECO

From this point on, you will be hiking on a combination of trail and washed out roads, from the 1938 flood. Since this is both a hiking and equestrian route, you will probably pass horseback riders on this section of the trail. If you do encounter horses, ask the students to move to the side of the trail and to remain quiet until riders and horses pass. People and equipment tend to spook the animals.

Continuing down the trail/road, you will pass Forest Service residences and a parking lot for the Jet Propulsion Laboratory. At the Pasadena Water Department Filtration Plant, a trail leads up the left slope to the end of Altadena Drive, just off Lincoln Avenue in Altadena.

Additional Information: John W. Robinson, Trails of the Angeles, Trip Numbers 15, 16 and 17.

TRAIL GUIDE FOR COOPER CANYON HIKE

This trail may be hiked either from the road head at Cloudburst Summit on the Angeles Crest Highway or from the Buckhorn Flat Campground. If you begin at the highway, the late afternoon will bring you to a nice, refreshing pool of water at the falls on Buckhorn Creek. There's a rope swing, and there are plenty of large rocks on which to relax. Altogether, it is a pleasant afternoon stop if you reverse the hike described below.

Friday night - Camp at Buckhorn Campground, 34 miles from La Canada off the Angeles Crest Highway.

Saturday - From the Buckhorn Campground, follow the Buckhorn Trail as it descends through pine and cedar following Buckhorn Creek. This part of the trail is cool and easy. Just before reaching the intersection with Cooper Canyon, you will have excellent views across steep valleys to the Mojave Desert--a good place to discuss transition zones. The transition between riparian and forest habitats is also worth noting. You will reach the Cooper Canyon Trail after hiking about two miles from the trail head. The trail forks at this point. Take the left fork and enjoy a rest or lunch stop on the banks of Cooper Creek. The students can leave their packs here and walk down the creek, following the right (south) side of the camp for a view of Cooper Canyon Falls. The descent to the base of the falls is steep and difficult. It is probably best not to let students do too much exploring here on their own.

From Cooper Creek, the trail now leads at a slight incline up and out of the canyon. There is less shade on this trail, and the ascent is somewhat strenuous. Encourage the class to take time to save energy and notice the rich variety of vegetation along the way. The creek winds in and out of alder and oak, and the trail takes you above it to the right. In about two more miles, you will arrive at Cooper Canyon Trail Camp. There are numerous camping sites. It has picnic tables, stoves, and outdoor toilets. The stream will probably be flowing in the spring. Generally, its water is considered safe to drink. If you are worried about the status of the water, ask the ranger at Buckhorn Station beforehand or use purification tablets or a filtering device. This camp was a favorite haunt of Indians and used to be called Squaw Camp. Two early Southern Californians, Ike and Tom Cooper, used the camp for their bear and deer hunting excursions in the 1890's (hence, its modern name, Cooper Canyon).

Sunday - Ask students to take a large drink of water and to fill their canteens before setting out. There is no water after you leave the campsite, and the trail is steep. The trail now becomes a road--broad and wide enough for two or three to walk comfortably together. You will be in a forest of Jeffrey pine, sugar pine, and incense cedar. Note the differences in vegetation as you hike up out of the canyon. It is about two miles to the Angeles Crest Highway. Since the trail is steep, take your time and enjoy the view and the chance to be outdoors. Once you reach the Angeles Crest Highway, you can hike back to Buckhorn Camp (1.5 miles) or meet the bus at this point (Cloudburst Summit). Be sure the driver knows this location. There is no sign marking it.

As mentioned earlier, the trip can be accomplished in reverse, since Cooper Canyon Campground is equidistant from Buckhorn.

For additional information, see John W. Robinson's Trails of the Angeles, Trips Numbers 61 and 62. This reference is available in most backpacking/ outdoor shops.

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CHANGES MAN HAS MADE TO THE WILDERNESS.... LET ME SEE, BAD CHANGES.
JIMMY'S CAMPING LOGBOOK

SOURCE MATERIALS FOR CONVERSATION/ ENVIRONMENTAL EDUCATION

Environmental Service Center
U.S. Bureau of Sport Fisheries and Wildlife
Department of the Interior
Fort Snelling, MN

"National Refuges and Environmental Education"

"Outdoor Classroom Environmental Education Guide"

U.S. Forest Service
Department of Agriculture
Washington, D.C. 20036

"Teaching Conversation Through Outdoor Education Areas"

"Teaching Materials for Environmental Education Investigating Your Environment"

U.S. National Park Service
Department of the Interior
Washington, D.C. 20036

"A Guide to Planning and Conducting Environmental Study Area Workshops"

ERIC/SMEAC
Ohio State University
400 Lincoln Tower
1800 Cannon Drive
Columbus, Ohio 43210

"Environmental Education Abstracts and Index from Research in Education, 1966-72"

WREEC (Western Regional Environmental Education Council)
Capitol Mall
Sacramento, CA 95814

"Resource Guide"

Magazines of Environmental Interest

Environment
P.O. Box 755
Bridgeton, Missouri 63044

The Living Wilderness
1901 Pennsylvania Avenue, N.W.
Washington, D.C. 20036

American Forests
The American Forestry Association
1319 Eighteenth Street, N.W.
Washington, D.C. 20036

Environmental Action Bulletin
The Rodale Press
Emmaus, Pennsylvania

Audubon
The Audubon Society
Washington, D.C. 20036

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National Wildlife Membership Services
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